PSYCHE

A JOURNAL OF ENTOMOLOGY

ESTABLISHED IN 1874

VOL. L MARCH–JUNE, 1943 Nos. 1–2

TABLE OF CONTENTS

The Corpus Allatum of the Sheep Ked, *Melophagus ovinus* L. *M. F. Day* 1

New Species of *Bothriocera* Burm. (Homoptera: Cixiidæ) from the Lesser Antilles. *R. G. Fennah* 9

Kalotermes milleri, a New Species of Termite from the Florida Keys and Jamaica (Isoptera, Kalotermitidæ). *Alfred E. Emerson* 18

Some New *Calisto* from Hispaniola and Cuba (Lepidoptera: Satyridæ) *Harry K. Clench* 23

Revision of the Genus *Pleuropompha* Leconte (Coleop., Meloidæ). *F. G. Werner* 30

The Female of *Neonympha maniola* Nabokov (Lepid.-Satyridæ). *V. Nabokov* 33

Three New Species of *Cebrio* (Coleop., Cebrionidæ). *F. G. Werner* 34

Descriptions of Some New Exotic Species of Stag Beetles (Coleoptera: Lucanidæ). *Bernard Benesh* 37

Some North American Species of *Chætopleurophora* (Diptera, Phoridæ). *Charles T. Brues* 50

CAMBRIDGE ENTOMOLOGICAL CLUB

OFFICERS FOR 1942–1943

President . . . . . NATHAN BANKS
Vice-President . . . . . C. T. BRUES
Secretary . . . . . G. E. ERIKSON
Treasurer . . . . . J. C. BEQUAERT
Executive Committee . . . . N. BANKS
. . . . T. BARBOUR
. . . . F. M. CARPENTER

EDITORIAL BOARD OF PSYCHE

EDITOR-IN-CHIEF

C. T. BRUES, HARVARD UNIVERSITY

ASSOCIATE EDITOR

F. M. CARPENTER, HARVARD UNIVERSITY

CONSULTING EDITORS

NATHAN BANKS, Harvard University.

A. E. EMERSON, University of Chicago.

THOMAS BARBOUR, Harvard University.

A. L. MELANDER, College of the City of New York.

RICHARD DOW, Reading, Mass.

J. G. NEEDHAM, Cornell University.

PSYCHE is published quarterly, the issues appearing in March, June, September, and December. Subscription price, per year, payable in advance: $2.00 to Subscribers in the United States; Canadian and foreign subscriptions $2.25, payable at par. Single copies, 65 cents.

Cheques and remittances should be addressed to Treasurer, Cambridge Entomological Club, Biological Laboratories, Harvard University, Cambridge, Mass.

Orders for back volumes, missing numbers, notices of change of address, etc., should be sent to Professor F. M. Carpenter, Biological Laboratories, Harvard University, Cambridge, Mass.

IMPORTANT NOTICE TO CONTRIBUTORS

Manuscripts intended for publication, books intended for review, and other editorial matter, should be addressed to Professor C. T. Brues, Biological Laboratories, Harvard University, Cambridge, Mass.

Authors contributing articles over 8 printed pages in length will be required to bear a part of the extra expense, for additional pages. This expense will be that of typesetting only, which is about $2.00 per page. The actual cost of preparing cuts for all illustrations must be borne by contributors; the expense for full page plates from line drawings is approximately $5.00 each, and for full page half-tones, $7.50 each; smaller sizes in proportion.

AUTHOR'S SEPARATES

Reprints of articles may be secured by authors, if they are ordered before, or at the time proofs are received for corrections. The cost of these will be furnished by the Editor on application.

Printed by the Harvard University Printing Office, Cambridge, Mass., U. S. A.

PSYCHE

VOL. L MARCH–JUNE, 1943 NOS. 1–2

THE CORPUS ALLATUM OF THE SHEEP KED, *MELOPHAGUS OVINUS* L.

BY M. F. DAY

Washington University, St. Louis, Mo.

It has recently been shown (Thomsen, 1941; Day, 1943) that the condition of the corpus allatum and corpus cardiacum in muscoid flies is highly specialized when compared with other insects, since these glands have fused to form the so-called Weismann's Ring or ring gland. Burtt (1937) has found that this condition is not found in the Nematocera which he studied, for a typical paired corpus allatum was present in the larva of species of *Chironomus* and *Tipula*. However, Burtt considered the corpus cardiacum to represent the œsophageal ganglion.

In view of the interesting physiological effects of the ring gland on the ovaries reported by Thomsen (1940), the condition of the corpora allata and cardiaca in *Melophagus* presents a particularly interesting problem, for in this insect viviparity is highly developed. No observations on these glands in *Melophagus* are to be found in the literature, except those embryological studies of Pratt (1901) referred to below. Other anatomical studies include those of Hoare (1923) and Hardenburg (1929).

The following notes on the corpora allata and cardiaca of *Melophagus* are presented here as one of a series of investigations of these glands in the Order Diptera. Conclusions regarding the homologies of the structures described are based upon morphological and comparative histological evidence.

The techniques employed have been described previously (Day, 1943).

Observations on Larvæ

Since almost the entire larval life is spent in the uterus of the female ked, the young larva can be obtained only by dissection or in serial sections of the parent fly. All larval tissues retain many embryonic characteristics. According to Pratt (1901, p. 261) the glands (which he refers to throughout as ganglia allata, following Heymons, 1895) arise from the headfold as a pair of spherical bodies, probably from the lateral ectoderm, rather than from the ventral ectoderm as in most other insects. This is not surprising, however, in view of the great modification in the development of other organs of these Diptera when compared with more generalized insects.

The number of larval instars has not been determined. Larvæ are therefore classified according to their size. Three stages are described in detail. The youngest larva studied in the present series was about 0.8 mm. in length. This stage is only slightly more advanced than Pratt's (1901) Figs. 43 and 44, and already the tissue forming the corpora allata can be clearly distinguished from the brain tissue. The unusually large size of the cells is clearly seen in Pratt's illustrations. Cytologically the corpus allatum cells are very characteristic, presenting a considerably larger amount of even, deeply staining, basophilic cytoplasm than is found in any other cells of the embryo.

In a larva approximately 2 mm. in length (Fig. 1) the gland has increased in cell size and in cell number, but not to such an extent that each cell could have divided once. The cytoplasm is even more basophilic than that of the younger larva, and the cells appear to be in a state of secretory activity. In five mature larvæ studied corpora allata are greatly enlarged (Fig. 2). It is to be noted that the gland is a paired structure and thus differs fundamentally from the median corpus allatum of the Brachycera. Moreover, the cells composing it are large and conspicuous and show cytological indications of considerable activity, while the corpus allatum in the larva of Brachycera shows no cytological evidence of secretory changes. The corpus cardiacum, however, is inconspicuous in the larva of *Melophagus*, again in striking contrast to the situation in the Brachycera.

Each corpus allatum of a mature larva measures approximately 150 microns x 125 microns, and extends from the median region laterally between the imaginal discs and the dorsal ex-

tension of the developing gut. The cells comprising the gland have distinct cell boundaries and show no indications of forming a syncytium. While there is some variability in nuclear size, there does not appear to be any differentiation into more than one cell type. Measurements of the diameters of 100 nuclei from both glands of a single larva, representing approximately one fifth of the total nuclei, give a unimodal distribution curve with a range of 8.5 to 13.0 microns and a mean of 11.0 microns. Nucleoli are conspicuous and the chromatin evenly distributed following the fixatives employed. The cytoplasm in the cells at this stage exhibits conspicuous vacuoles which are generally peripherally located. There are usually one or two large vacuoles and a number of smaller ones, which give the cytoplasm the appearance of a reticulum, especially after Bodian's technique. As compared with the young larva, the cells representing the corpus cardiacum have been greatly reduced. From cytological evidence it would appear that their principal activity occurs during larval development.

The Pupa. It would be desirable to have a closely spaced series of pupæ, for during this time very active changes occur in the cells of the corpora allata. Unfortunately only a few pupæ (3 "white" pupæ, 1 of about two weeks of age and 2 nearly mature pupæ) were available, but these all agree in showing a marked reduction in the size of the corpora allata. Not only does the cytoplasm become reduced, but nuclear size also decreases. This decrease amounts to about 25 per cent of the former volume. Rhythmic increase in nuclear size is a not uncommon phenomenon in insect tissues (see Geitler, 1940, for review), but a striking decrease as found here is unusual. Moreover, there is a decrease in number of cells, a change reminiscent of that undergone by the mammalian thymus during development, and, as in the thymus, the mechanism of the reduction of the cell number has not been determined.

Pupal development of *Melophagus* occupies approximately three weeks. The puparium is white in color immediately after formation, but it hardens and darkens within about four hours. The corpus allatum of the white pupa is not unlike that of the fully grown larva. Considerable vacuolization of the cytoplasm is evident; the cells are approximately 15 microns in diameter and the nuclei average about 8.7 microns. As development proceeds, the cells lose more and more cytoplasm until, by the end

of pupal development, they have assumed the form found in the adult. The glands have moved posteriorly, and come to lie, as they do in all adult Diptera, immediately in front of the proventriculus.

The Adult. No differences have been found in the corpora allata of male (Fig. 3) and female (Fig. 4) *Melophagus*, nor in female *Melophagus* with or without larvæ. The glands are ovoid, measuring approximately 75 microns x 60 microns. Each contains approximately twenty cells in cross section in the region of greatest diameter, the cells having approximate dimensions of 12 microns x 13 microns. The two glands lie one on each side of the dorsal aorta (Figs. 5 and 6). Ventral to them are the convolutions of the salivary glands, and immediately above them there are conspicuous tracheal trunks, which arise from the mesothoracic spiracles. Immediately above the aorta there are numbers of large pericardial cells which are frequently multinucleate, and possess a coarsely reticulated cytoplasm.

The cytoplasm of the cells of the corpora allata is sparse in comparison with that of the previous stages, and contains few or no vacuoles. The diameter of the nuclei is approximately 7.3 microns. Their volume is thus approximately 25 per cent that of the nuclei of the mature larvæ. The single large nucleoli are almost always eccentric. The cells are well innervated by nerve fibers arising from the region of the corpus cardiacum. Almost all traces of the secretory elements of the last mentioned gland have disappeared, but there remain a number of nerve cell bodies representing the hypocerebral ganglion. These are loosely arranged, and do not form a compact gland-like structure as is found in *Lucilia*. A second cell type represented by small cells scattered among the nerve cell bodies is probably connective tissue and supporting cells. The gross arrangement of the incretory organs is most clearly seen in Fig. 6.

The most striking point of the observations reported above is the fact that the changes undergone by the corpora allata of *Melophagus* are so different from those occurring in *Lucilia sericata* as described by Day (1943). Whereas in the latter, the corpus allatum is very inconspicuous in the larva, and its cells reproduce by mitosis during the pupal period, in *Melophagus* the corpora allata reach their maximum size during late larval development, and are considerably reduced in both

pupa and adult. Cytologically the cells of the adult *Melophagus* behave similarly to those of *Lucilia*. Neither show visible evidence of secretory activity, though in *Lucilia*, at least, marked physiological effects of the ring gland have been demonstrated by experiments.

The changes undergone by the cells of the corpora allata which have been described above can be tabulated as follows:

TABLE 1

CHANGES IN THE CELLS OF THE CORPORA ALLATA OF *Melophagus* DURING DEVELOPMENT

Stage	Approximate number of cells in each corpus allatum	Average size in microns	
		Nucleus	Cell
2 mm. larva	250	6.9	11 x 15
mature larva	300	11.0	17 x 19
white pupa	..	8.7	14 x 15
adult	100	7.3	12.5 x 13

The reduction in the corpus cardiacum during late larval and pupal development in *Melophagus* is in general similar to the reduction found in *Lucilia*, but this gland is never very conspicuous in *Melophagus* and practically absent in the adult.

It is perhaps not surprising to find such differences in the behavior of the incretory organs of *Melophagus* and *Lucilia* when one considers the great differences in their reproductive processes, but the fact that the corpus allatum is a single median organ in *Lucilia* and paired in *Melophagus*, as in Nematocera and the majority of insects, is evidence that there are some fundamental differences between the Hippoboscoidea and Muscoidea.

SUMMARY AND CONCLUSIONS

The incretory organs associated with the stomodeal nervous system of *Melophagus* exhibit the following characteristics:

1. There is a pair of corpora allata, as in Nematocera and the majority of other insects, rather than a median unpaired structure as in the higher Diptera. The cells and nuclei are extremely large in the larva, and so differ in this also from those of the corpora allata of the Brachycera.

2. The cells of the corpora allata exhibit cytological evidence of secretory activity in the young larva — thus differing fundamentally from the corpus allatum component of the ring gland of the Brachycera which have been studied.

3. The vacuolization of the cytoplasm of the corpus allatum cells at the time of puparium formation and pupation is comparable to that found in the corpora cardiaca of Brachycera, and suggests that the gland is physiologically active at this time.

4. The reduction in cytoplasm of the cells of the corpus allatum in the adult as compared with the larva is a further unique feature of *Melophagus*.

5. The corpus cardiacum is a single median organ, not well developed in the larva of *Melophagus*, decreasing in the pupa and practically absent in the adult. While the reduction during development is characteristic of Brachycera, the extreme reduction is unique among those insects which have been studied.

The many unusual characters enumerated above correlate with the unusual reproductive habits of *Melophagus*, but it would be of little value to suggest the functional significance of the observations until some experimental procedures have been applied to this most interesting insect. The difficulties of breeding this species under controlled conditions in the laboratory has so far made such work impractical.

Bibliography

Burtt, R. T.
1937. On the Corpora Allata of Dipterous Insects. Proc. Roy. Soc. B., 124:13–22.

Day, M. F.
1943. The Homologies of the Ring gland of Diptera Brachycera. Ann. Ent. Soc. Amer., 36:1–10.

Geitler, L.
1940. Neue Untersuchungen über Bau und Wachstum des Zellkerns in Geweben. Naturwiss., 28:247–248.

Hardenburg, J. D.
1929. Beiträge zur Kenntnis der Pupiparen. Zool. Jarb. Anat., 50:497–570.

Heymons, R.
1895. Die Embryonalentwicklung von Dermapteren und Orthopteren. 136 pp. Jena.

Hoare, C. A.
1923. An Experimental Study of the Sheep Trypanosome and its Transmission by the Sheep Ked, *Melophagus ovinus* L. Parasit., 15:365–424.

Pratt, H. S.
1901. The Embryonic History of Imaginal Discs in *Melophagus ovinus* L., together with an account of the Earlier Stages in the Development of the Insect. Proc. Boston Soc. Nat. Hist., **24**:241–272.

Thomsen, E.
1940. Relation between Corpus allatum and Ovaries in Adult Flies (Muscidae). Nature, **145**:28.

——1941. Ringdrüse und Corpus allatum bei Musciden. Naturwiss., **40**:605–606.

Description of Plate I

The corpora allata of *Melophagus ovinus* L. Figs. 1–4 from transverse serial sections, 10 microns in thickness, Bodian silver impregnation. Drawn with camera lucida with 10x ocular and 44x objective, magnification 200 diameters. Figs. 5–6 drawn from dissections of flies fixed by injection with alcoholic Bouin.

Fig. 1. T. S. 2 mm. larva, showing relationships of corpora allata, corpus cardiacum tissue and other tissues of the larval head. Note the large size of the cells of the corpora allata.

Fig. 2. T. S. portion of a mature larva showing huge increase in size of corpora allata mainly brought about by increase in cell size, which is accompanied by an increase in nuclear size.

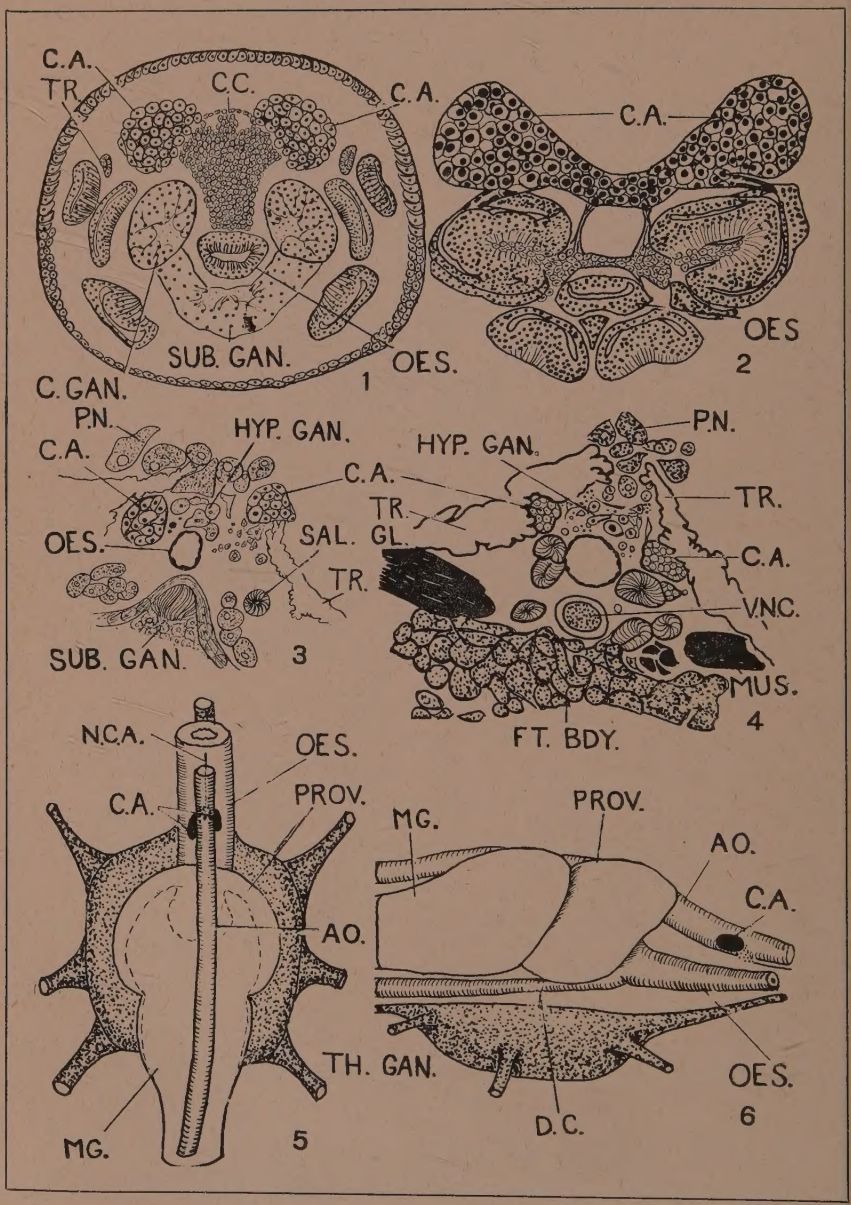
Figs. 3 and 4. T. S. head adult male and female *Melophagus* showing the paired corpora allata and their relation to other organs.

Figs. 5 and 6. Dorsal and lateral aspects of proventriculus, aorta and suboesophageal ganglion, showing the location and anatomical relationships of the corpora allata.

Key to Abbreviations

AO.	Aorta	N.C.A.	Nerve to corpora allata
C.A.	Corpora allata	OES.	Œsophagus
C. C.	Corpora cardiaca	P.N.	Pericardial nephrocytes
C. GAN.	Cerebral ganglion	PROV.	Proventriculus
D.C.	Duct to crop	SAL. GL.	Salivary glands
FT. BDY.	Fat body	TH. GAN.	Thoracic ganglion
HYP. GAN.	Hypocerebral ganglion	TR.	Trachea
M.G.	Midgut	V.N.C.	Ventral nerve cord
MUS.	Muscle fibers		

PSYCHE, 1943 VOL. 50, PLATE I



Day — Corpus allatum

NEW SPECIES OF BOTHRIOCERA BURM. (HOMOPTERA: CIXIIDÆ) FROM THE LESSER ANTILLES

By R. G. Fennah

Entomologist, Citrus Pests Investigation, Windward and Leeward Islands

In the present paper seven new species of *Bothriocera* Burm. are described. Five of them, *B. cyanea*, *B. phantasma*, *B. riparia*, *B. daedala* and *B. hastata* (see below), are apparently endemic in the one island from which each has been recorded: another species, *B. longistyla*, has been found only in two adjoining islands, while the seventh, *B. eborea*, has, by contrast, been taken in all islands where the writer has searched.

The relation of these species to Greater Antillean or mainland forms, and even to each other, is obscure, chiefly on account of the difficulty of assessing the value of the available morphological or chroic characters. As regards the pattern of the tegmina it is evident, from a scrutiny of over 700 specimens, that within any one island the pattern of a single species is constant, even in minute details; between islands, however, the differences in tegminal pigmentation of a single species are quite distinct, being revealed, not in changes of pattern, but in boldness of marking. In the genitalia the shape of the male genital styles seems to be a useful character, but forms which are allied in the possession of a common type show very different tegminal markings. On the whole, the writer is inclined to regard the following group of characters as providing the best basis for judging the affinity of Lesser Antillean species: (i) truncate styles of the *B. hastata* type, (ii) a periandrium with a process on the left side, (iii) a triangular median ventral process on the pygofer and (iv) an anal segment with the apical margin rounded. On the basis of possessing at least three of these characters all the species discussed below are allied with

the exception of *B. cyanea*, a species which also stands apart by reason of its tegminal markings. For the rest it appears that the various genital and chroic characters are combined at random.

The holotype males and allotype females of all the species described have been deposited in the U. S. National Museum, while paratype series of both sexes have been sent to the British Museum (Natural History), the American Museum of Natural History, and the Museum of Comparative Zoology, Cambridge, Mass., U. S. A.

Bothriocera Burmeister

1835 Burmeister, Handbuch der Entomologie, p. 156. Haplotype *B. tinealis* Burm.

Bothriocera cyanea sp. n.

Male. Length, 3.5 mm.; tegmen, 3.9 mm. Female. Length, 3.8 mm.; tegmen, 4.2 mm. Frons and clypeus piceous, lateral margins pale, almost white; genae piceous, antennal pit white; vertex piceous. Pronotum piceous, but almost white laterad on posterior half. Mesonotum dark, thorax fuscous ventrally. Fore legs piceous, middle and hind legs pale testaceous. Abdomen and genitalia brown. Tegmina pale yellow basally, smoky brown beyond a line from stigma to apex of clavus, clavus dark; stigma dark, often traversed by two parallel crimson lines. Wings smoky, pale at base. Insect in life densely powdered purplish blue and sulphur yellow.

Anal segment of male truncate at apex, lateral angles pointed. Periandrium tubular, penis forming a complete loop round periandrium, outer border minutely serrate distally. Genital styles with apex broadly rounded, a thin lobe lateroventrally at right angles. A small knob at outer angle. Inner border of style concave at base, convex distally. Median ventral process of pygofer semicircular with a minute point at apex.

Described from 17 males and 14 females collected by the writer at 800 ft. in mountain forest near the Imperial Road, Dominica, B. W. I. (June 11–30, 1939; June 15–29, 1940) resting on *Palicourea crocea* and *Inga laurina*. This species is distinguished by the male genitalia and by the dark tegmina with a pale basal spot.

Bothriocera phantasma sp. n.

Male. Length, 2.9 mm.; tegmen, 3.5 mm. Female. Length, 3.0 mm.; tegmen, 3.8 mm. Frons, clypeus, genae, vertex and pronotum white or pale yellow. Mesonotum piceous, pleura pale; coxae smoky, profemora smoky, pro-tibiae and tarsi, middle and hind legs very pale. Abdominal sternites and membrane pale, tergites and genitalia fuscous. Tegmina transparent; a spot at apex of costal cell, a dark line from stigma to apex of clavus sharply interrupted in middle, cross-veins of apical region dark; two spots on R veins near apex of costal margin; a dark spot at base of Cu; clavus smoky posterior to veins. Wings transparent, smoky towards base of anal veins. Insect in life powdered greyish.

Anal segment of male truncate apically, apical angles produced into large rounded lobes. Periandrium tubular, a broad hook-like process directed dorsally and anteriorly on left side near apex. Penis broadest in middle, forming loop of 270 degrees, minutely serrate at apex and at base near junction with apodeme. Genital style with inner margin concave at base, convex in middle, slightly concave at apex, posterior angle only just obtuse; apex truncate; inner angle slightly produced. Median process on pygofer between base of styles forming an isosceles triangle with angles truncate.

Described from 15 males and 12 females collected by the writer at 1,000 ft. in mountain forest near the Imperial Road, Dominica, B. W. I. (June 15–29, 1940) on epiphytic aroids.

Bothriocera riparia sp. n.

Male. Length, 4.6 mm.; tegmen, 5.0 mm. Female. Length, 4.7 mm.; tegmen, 5.1 mm. Head, thorax, legs, abdomen and genitalia (excluding ovipositor) white; abdominal tergites occasionally fuscous, abdomen sometimes tinged with pink; ovipositor fuscous. Tegmina transparent, slightly yellow; stigma black, a dark spot contiguous posteriorly; a dark spot at first fork of M; subapical cross-veins pale smoky; a dark trace at base of second apical cell of R; clavus pale. Wings transparent. Insect in life powdered grey.

Anal segment of male bluntly rounded at apex; periandrium tubular with an elongated vertical process, rounded at apex, on left side; penis wide apically, a large evenly-serrated lobe attached to middle, inner margin serrate, membrane minutely denticulate near apex. Inner border of genital styles with two indentations, obtusely

angled at apex; apex truncate. Median ventral process of pygofer forming an isosceles triangle with sides convex in apical half.

Described from 27 males and 33 females collected by the writer at 2,000 ft. on Morne Garu (Aug. 20, 21, 1941), and at Three Rivers (Sept. 3–5, 1941), St. Vincent, B. W. I., mostly resting on *Tabernaemontana* sp. and *Heliconia bihai*. The species is distinguished by the pattern of the tegmina, which, though of a common type, is characteristic in its details, and by the conspicuous processes on the periandrium and penis.

Bothriocera longistyla sp. n.

Male. Length, 3.4 mm.; tegmen, 4.2 mm. Female. Length, 3.5 mm.; tegmen, 4.4 mm. Frons, clypeus, vertex, pronotum and legs pale testaceous, margins of antennal pit narrowly fuscous; mesonotum dark testaceous or fuscous; abdomen and genitalia brown or fuscous. Tegmina transparent, ivory yellow; veins lightly clouded, except R, M, and Cu at base; an interrupted narrow band from stigma to apex of clavus; subapical cross-veins narrowly clouded; clavus pale, smoky behind posterior vein. Wings transparent, clouded over part of anal area. Insect in life powdered grey.

Anal segment of male with posterior border bluntly rounded. Periandrium tubular, a broad process on left side tapering to a point anteriorly. Penis looping in a semicircle, irregularly serrate along margin, tapering to a fine point. Genital styles narrow, elongate, obtusely angled near middle, tapering slightly to a blunt point at tip. Median ventral process of pygofer subconically rounded.

Described from 30 males and 41 females collected by the writer at 1,000 ft. in mountain forest near Quilesse, St. Lucia, B. W. I. (March 20, 21, 1939) and on Morne Fortunée, St. Lucia at 750 ft. (Feb. 2–5, 1940), resting on *Miconia* sp., *Tabernaemontana* sp., and *Inga laurina*. The species is readily distinguished by its pale tegmina and long tapering styles, and by the shape of the periandrium. A long series from Morne Garu, St. Vincent, B. W. I. (coll. R. G. F. Aug. 20, 21, 1941) is assigned to this species, but differs constantly in having the tegmina wholly transparent and unmarked, and a periandrial process with a broader base. The St. Lucian variety is designated as *B. longistyla* var. *vulgaris* and the St. Vincent variety as *B. longistyla* var. *pallida*.

Bothriocera daedala sp. n.

Male. Length, 3.0 mm.; tegmen, 3.4 mm. Female. Length, 3.1 mm.; tegmen, 3.7 mm. Frons and clypeus pale yellow, lateral margins slightly darker, vertex and margin of antennal pit piceous; genae and antennae pale yellow. Pronotum pale or dark, pale laterally; mesonotum fuscous. Ventral surface of thorax pale, legs slightly darker; abdominal tergites and sternites fuscous, genitalia fuscous. Tegmina pale basally, mostly dark distad of a line from stigma to apex of clavus, a pale spot just distad of stigma, a small spot distad of this on margin; a round pale spot posterior to stigma in middle of tegmen; apical cells almost entirely pale to apical margin; a small dark spot between M1a and M1b; apical cells of Cu and clavus wholly dark. Wings smoky, pale basally, a pale spot apically. Insect in life powdered blue-grey.

Anal segment of male truncate apically in a straight line. Periandrium tubular, with a large broad lobe on left side near apex directed dorso-anteriorly to a blunt point. Penis looping for slightly more than a semicircle, a small lobe with about eight teeth on dorsal side in middle; an irregular line of teeth from inner side near base of penis to dorsal margin one third from apex. Genital styles with inner border concave at base, obtusely angled apically; apex truncate. Median process of pygofer between styles in form of an isosceles triangle with convex sides, apex pointed.

Described from 64 males and 71 females collected by the writer at 1,000 ft. in mountain forest near the Imperial Road, Dominica, B. W. I. (June 11–30, 1939; June 15–29, 1940) resting on low bushes. This species is distinguished by the pattern of the tegmina, which is somewhat similar to that of *B. signoreti* Stål, and by the male genitalia.

Bothriocera hastata sp. n.

Male. Length, 3.2 mm.; tegmen, 3.6 mm. Female. Length, 3.6 mm.; tegmen, 4.0 mm. Frons piceous, testaceous laterally; clypeus fuscous, narrowly pale laterally; antennae pale. Vertex, pro- and mesonotum piceous. Femora smoky, protibiae and tarsi smoky, mesotibiae and tarsi testaceous, metatibiae and tarsi very pale. Abdomen and genitalia fuscous. Tegmina pale yellow basally; a fuscous spot at apex of costal cell, a broad dark band from stigma to apex of clavus, tegmina distad of this line mostly fuscous; a transparent spot

distad of stigma, a large round transparent spot posterior to this, a small pale spot at margin between Sc and R, a minute spot between M1 and M2, an elongated pale spot subapically crossing four apical cells. Wings smoky, pale basally, a pale round spot in apical half. Insect in life powdered bluish-grey.

Anal segment of male bluntly rounded at apex. Periandrium tubular, a long, somewhat narrow curved process on left side directed upward and anteriorly, beset with numerous minute teeth at tip. Penis somewhat narrow, looping in a semicircle; a bluntly conical projection near base, a few coarse teeth on inner border at basal quarter, a small but prominent coarsely-serrated crest just beyond middle. Genital styles with inner border concave basally, obtusely angled distally; apex truncate. Median ventral process of pygofer forming an isosceles triangle with sides slightly convex.

Described from 22 males and 24 females collected by the writer at 2,000 ft. in mountain forest on Morne Garu, St. Vincent, B. W. I. (Aug. 20 and 21, 1941), resting on *Heliconia bihai* and aroids. This species broadly resembles *B. daedala* but is well distinguished by the tegminal pattern, as well as by characters of the anal segment, the periandrium, and the penis. According to Mr. China this species is identical with specimens from St. Vincent identified by Uhler as *B. signoreti* Stål. It seems to be endemic in St. Vincent.

Bothriocera eborea sp. n.

Male. Length, 3.4 mm.; tegmen, 4.1 mm. Female. Length, 4.1 mm.; tegmen, 4.8 mm. Frons fuscous, testaceous towards and on lateral margins, clypeus pale medially, fuscous on each side of middle line, testaceous at margins, genae and antennal pits testaceous yellow; vertex pale fuscous, testaceous laterally. Pronotum testaceous; mesonotum, abdomen and genitalia piceous; legs dark testaceous. Tegmina with a dark band from stigma to apex of clavus; apical portion of veins, cross-veins, and membrane at apical margin clouded with brown; clavus wholly brown. Wings transparent basally, cross-veins dark, distal portion of wings smoky. Insect in life powdered bluish-grey.

Anal segment of male rounded into a semicircle at apex. Periandrium tubular, dorsal border sinuate, terminating in a broad lobe directed anteriorly, slightly crenulate at rounded tip. Penis with a small curved coarsely-toothed process at base, a curved spine, often

somewhat transparent, on inner margin one-third from base; at apex of membrane a very small projection at outer edge, and a long spinose recurved process at inner edge; a long curved transparent process arising two-thirds along penis and projecting anteriorly, terminating in a rounded, spatulate, or cup-like apex. Genital styles with inner border deeply concave at base, obtusely angled distally; outer border concave, apex truncate. Median ventral process of pygofer small, triangular.

Described from 14 males and 21 females collected by the writer at 1,300 ft. in forest near Ottley's Level, St. Kitts, B. W. I. (Jan. 26, 27, 1942) resting on *Tabernaemontana* sp. and on aroids.

The writer has long series of this species from other islands, collected as follows: 1,000 ft. in forest near Quilesse, St. Lucia, B. W. I. (coll. R. G. F. Mar. 20, 21, 1939); 800 ft. in forest near Mahaut, Dominica, B. W. I. (coll. R. G. F. June 14, 1939); 1,300 ft. in forest, Chance's Mountain, Montserrat, B. W. I. (coll. R. G. F. Jan. 18, 1939); 2,000 ft. in forest, Morne Garu, St. Vincent, B. W. I. (coll. R. G. F. Aug. 20, 21, 1941); 1,000 ft. in forest, Nevis, B. W. I. (coll. R. G. F. Jan. 18, 1942). There are differences in intensity of pigmentation between series from different islands, and the genitalia afford the only reliable means of identification.

EXPLANATION OF PLATE II

1–5 *Bothriocera cyanea*

1. Anal segment of male, dorsal view; 2. Periandrium, lateral view; 3. Penis, lateral view; 4. Genital style, lateral view; 5. Median ventral process of pygofer.

6–10 *B. phantasma*

6. Anal segment of male, dorsal view; 7. periandrium, lateral view; 8. Penis, lateral view; 9. Genital style, lateral view; 10. Median ventral process of pygofer.

11–15 *B. riparia*

11. Anal segment of male, dorsal view; 12. Periandrium, lateral view; 13. Penis, lateral view; 14. Genital style, lateral view; 15. Median ventral process of pygofer.

16–20 *B. longistyla*

16. Anal segment of male, dorsal view; 17. Periandrium, lateral view; 18. Penis, lateral view; 19. Genital style, lateral view; 20. Median ventral process of pygofer.

21–25 *B. daedala*

21. Anal segment of male, dorsal view; 22. Periandrium, lateral view; 23. Penis, lateral view; 24. Genital style, lateral view; 25. Median ventral process of pygofer.

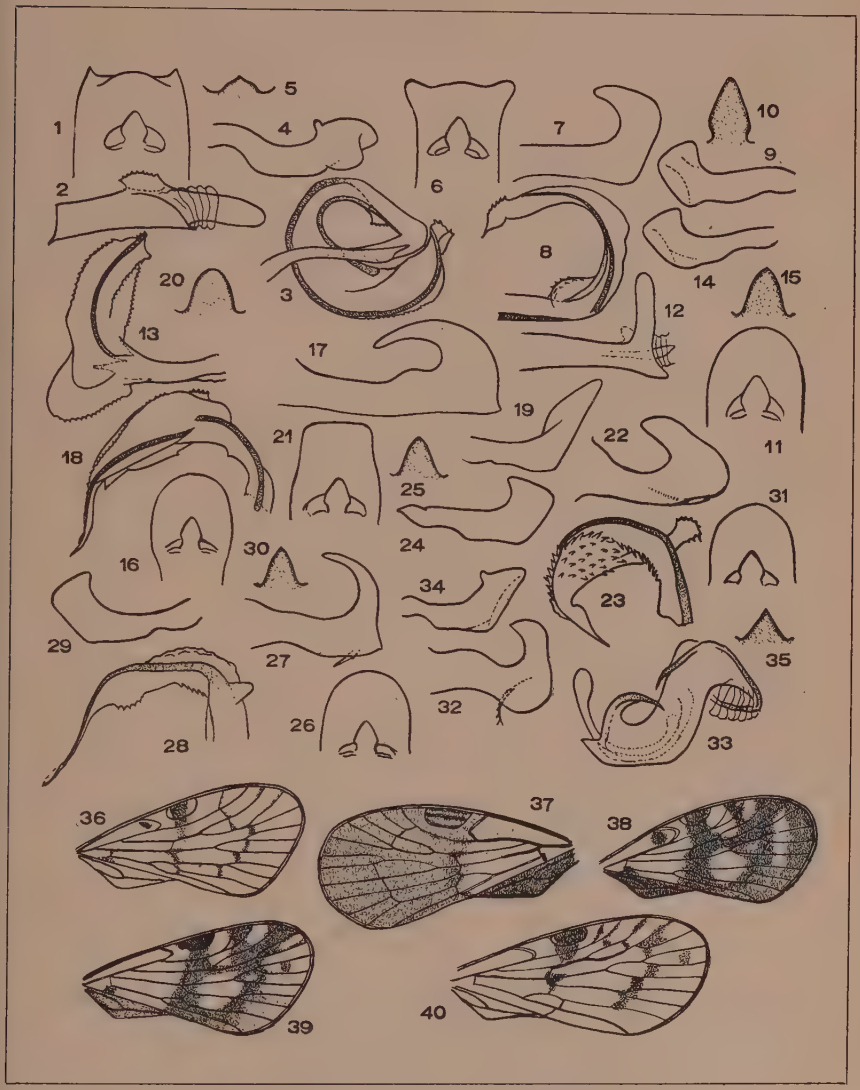
26–30 *B. hastata*

26. Anal segment of male, dorsal view; 27. Periandrium, lateral view; 28. Penis, lateral view; 29. Genital style, lateral view; 30. Median ventral process of pygofer.

31–35 *B. eborea*

31. Anal segment of male, dorsal view; 32. Periandrium, lateral view; 33. Penis, lateral view; 34. Genital style, lateral view; 35. Median ventral process of pygofer. 36. *B. phantasma*, tegmen; 37. *B. cyaneà*, tegmen; 38. *B. hastata*, tegmen; 39. *B. daedala*, tegmen; 40. *B. eborea* (St. Kitts), tegmen.

PSYCHE, 1943 VOL. 50, PLATE II



Fennah — New species of Bothriocera

KALOTERMES MILLERI, A NEW SPECIES OF TERMITE FROM THE FLORIDA KEYS AND JAMAICA (ISOPTERA, KALOTERMITIDÆ)[1]

By Alfred E. Emerson

Hull Zoological Laboratory, University of Chicago

The number of undescribed species of termites to be found within the borders of the United States is probably quite small. During trips to Florida (1941) and to the southwestern states (1937, 1941) extensive collections of termites were made enabling me to make new associations of reproductive castes with soldiers in several instances, to gather sufficient population samples to indicate that several named forms are only variants and should not be classified as distinct species, and to extend and clarify the ranges of distribution of many species. After a more thorough study of these collections, I plan to publish a revision of the termites of the United States. As such a study may take several years to complete, it seems best to add the following species to the fauna without delay.

This new species of *Kalotermes* is the smallest member of the genus (*s. str.*) in the United States. The fact that it is found both in the Florida Keys and in Jamaica is not surprising as there are a number of Neotropical species of termites which reach the southern tip of Florida but do not extend north of the tropical area. In time it may be expected that this species will be found in Cuba and possibly other West Indian islands.

Kalotermes milleri, new species

Imago (figs. 1 and 2).

Head, pronotum and abdominal tergites dark shining brown; labrum yellow; sternites a little lighter than the tergites; femora, tibiae and tarsi light yellowish; costal margin of wing and radial veins brown, wing membrane hyaline.

[1] The present investigation was aided by a grant from the Dr. Wallace C. and Clara A. Abbott Memorial Fund of the University of Chicago.

Head and pronotum with scattered bristles and hairs; each tergite and sternite with a few short hairs and long bristles on the posterior portion.

Head oval, the Y-suture not conspicuous. Eye fairly small (fig. 2), somewhat angular, about two-thirds of its long diameter from the lower margin. Ocellus in contact with the eye or close to the eye with only a thin brown line separating it from the ocular suture. Antennae with thirteen articles, the third equal to or slightly shorter than the second and about equal to or a little longer than the fourth.

Pronotum (fig. 1) about the width of the head, about five-eighths as long in the middle as the width, with slightly rounded sides, front margin evenly concave and hind margin slightly emarginate. Forewing scale overlapping the base of the hindwing scale when at rest. In the forewing the subcostal vein joins the costal border close to the suture, R_1 absent, R_{2+3} runs singly to the costal border a little beyond *Sc*, R_{4+5} with about six superior branches, *M* weaker than the radius and running midway between the radius and cubitus, *Cu* running out near the tip of the wing with numerous inferior branches. Anal vein in the hindwing quite thick. Arolium present between the tarsal claws.

Measurements in millimeters: —

Length with wings	7.52–7.76
Width of head	0.84–0.93
Diameter of eye	0.22–0.27
Eye from lower margin	0.15–0.18
Length of ocellus	0.09–0.11
Length of pronotum	0.51–0.59
Width of pronotum	0.80–1.00
Length of hind tibia	0.68–0.76
Length of forewing	5.92–6.10
Length of forewing from suture	5.26–5.37
Width of forewing	1.29–1.30

Paratype alates of *K. bequaerti* Snyder from Banos, Oriente, Cuba have longer wings, are yellow instead of dark brown, and have a distinctly larger eye.

Soldier (figs. 3, 4 and 5).

Head and body yellowish with the front of the head and mandibles a contrasting dark brown to black.

Head, pronotum and tergites with a number of scattered bristles.

Head (fig. 3) elongate with somewhat curved or straight parallel sides; a thick prominent dark ridge above the base of the antenna; a whitish eye spot behind the base of the antenna. Postmentum ("gula") about half or less than half as wide in the middle portion as in the anterior region (fig. 5), sides rather evenly concave from the widest region to the posterior end. Mandibles (figs. 3 and 5) with bases slightly curved on the outside edge and tips curved inward; left mandible with three marginal teeth, the second and third with sinuate edges together making a symmetrical marginal outline; the right mandible with two prominent marginal teeth about equal in size. Antennae with ten to eleven articles, the third about twice the length of the second and darker than the outer articles.

Pronotum (fig. 3) proportionately long, sides fairly straight, front margin angularly emarginate and edges somewhat turned up to fit the back of the head and sometimes flared outward at the junction with the sides, hind margin evenly and convexly curved. Femora swollen and tibiae rather short and thick, less than half as wide as the femora. Tibiae with three terminal thick dark spines.

Measurements in millimeters: —

Length of head with mandibles	2.21–2.71
Width of head	0.94–1.12
Widest width of postmentum	0.41–0.49
Narrowest width of postmentum	0.16–0.23
Length of left mandible	0.91–1.06
Width of pronotum	0.92–1.06
Length of pronotum in middle	0.56–0.79
Length of hind tibia	0.71–0.88

A single paratype soldier of *K. bequaerti* Snyder from Banos, Oriente, Cuba has proportionately wider pronotum and the tips of the mandibles are a little straighter. I am not sure that these characters will always show specific distinction in a large series.

The descriptions are based upon eight reproductives and about thirty-seven soldiers. Samples from eight colonies were collected on the Florida Keys by Dr. E. M. Miller of the University of Miami, Coral Gables, Florida, and by the author. I have recently received samples from three colonies collected in Jamaica by Dr. E. A. Chapin of the U. S. National Museum to

whom I am indebted for these and other collections. I take pleasure in naming this species in honor of Dr. E. M. Miller who has collected extensively in Florida and who has recently published interesting studies on caste development in *Prorhinotermes*. Dr. Miller has a paper in press dealing with Florida termites. The collection records of *K. milleri* are as follows: —

Type locality: — Elliott Key, Florida: holotype queen, morphotype soldier, and paratype king and soldiers collected by E. M. Miller, 7.II.1942; paratype dealate and soldiers from four colonies collected by A. E. Emerson, 22.III.1941; paratype soldiers collected by E. M. Miller, 7.V.1938.

Other localities: — Key Largo, Florida: paratype soldiers from two colonies collected by E. M. Miller, 21.III.1931. Bluefields Bay, Jamaica: paratype alates and soldier collected by E. A. Chapin, 20.V.1941, Sta. 588, in old stump. Portland Ridge, Jamaica: paratype dealate and soldiers collected by E. A. Chapin, 3.V.1941, Sta. 539, dead standing tree; paratype soldier collected by E. A. Chapin, 3.V.1941, Sta. 537, dead tree.

The holotype queen, morphotype soldier and a series of paratypes are deposited in the collection of the American Museum of Natural History now in the author's possession. Paratypes will be deposited in the U. S. National Museum, Museum of Comparative Zoölogy and Field Museum of Natural History.

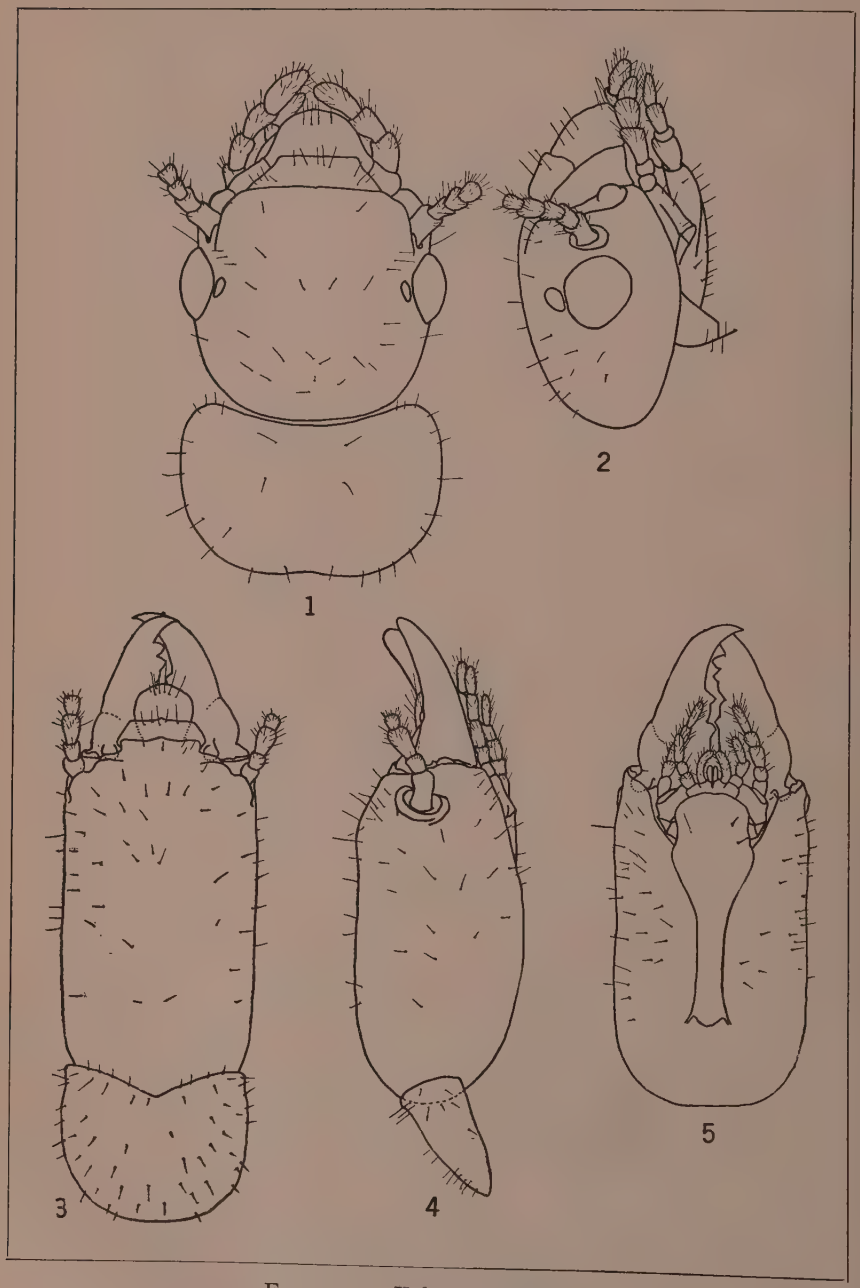
The general biology of the species as far as observed conforms with that of its congeners. It is found in dead hard wood in logs, stumps, standing dead trees and dead branches of living trees. The galleries are often comparatively small in conformity with the small diameter of the soldiers and nymphs. The eggs are laid singly in the galleries inhabited by the queen without any differentiated royal cell. Pellets of excrement are deposited in some of the galleries. It is to be expected that the species will ultimately be found in the hard wood of buildings within the area of its natural range.

EXPLANATION OF PLATE III

Kalotermes milleri, new species

FIG. 1. Head and pronotum of imago from above.
FIG. 2. Head of imago from side.
FIG. 3. Head and pronotum of soldier from above.
FIG. 4. Head and pronotum of soldier from side.
FIG. 5. Head of soldier from below.

PSYCHE, 1943 VOL. 50, PLATE III



Emerson — *Kalotermes milleri*

SOME NEW CALISTO FROM HISPANIOLA AND CUBA (LEPIDOPTERA: SATYRIDÆ)*

By Harry K. Clench
Cambridge, Mass.

The following new *Calisto* are based upon material collected during the past few years by M. Bates, P. J. Darlington, and C. T. Parsons on various expeditions for the Museum of Comparative Zoölogy.

Calisto batesi, new species

Upperside:

Male. Blackish brown, deeper toward the base of the hind wing. Fore wing with a large area of jet black, covering the basal two-thirds of the wing.

Underside:

Male. Both wings grayish brown, base of the hind wing slightly darker. *Fore wing* with two submarginal lines (the inner one heavier) and a discal line. Near the costa, between the latter and the basal one of the former, there is a black, yellow-ringed ocellus, with two minute white pupils within. Cell with a large red patch, extending from near base almost to cell-end. *Hind wing* with a post-basal, discal and two submarginal lines, the latter both badly dislocated at each intersection with a vein. The discal line approaches these and almost meets them at the anal angle. Between the discal and the submarginal lines, in the Cu_1–Cu_2 interspace, is a tiny ocellus, black, yellow rimmed, as in that of the fore wing, but here with only one central white pupil. Between the same lines, but in the M_2–M_3–Cu_1 interspaces, are two small white spots, placed parallel to the body line, rather than to the outer margin.

Length of fore wing, 14 mm.

Holotype, male, Loma del Toro, foothills of the Cordillera

* Published with the aid of a grant from the Museum of Comparative Zoology, Harvard College.

Central, south of Santiago, Republica Dominicana, Hispaniola, ± 5000 feet, June 1938 (P. J. Darlington). M. C. Z. no. 25915.

Remarks. Calisto batesi differs from the related *grannus* [1] in several points. The cell of the fore wing below is concolorous with the ground, while in *grannus* it is red. The ocellus of the fore wing below is smaller than in *grannus* (even smaller than in the paratypes of *grannus* from Loma Rucilla, Rep. Dom., whose ocelli were noted by Bates to be smaller than those of the remaining (Valle Nuevo, Rep. Dom.) paratypes). On the hind wing below *batesi* may be distinguished from *grannus* by the absence of the apical ocellus and the greatly reduced size of the anal one. The discal line appears to be lighter in *batesi* than in *grannus* (on both wings below), and on the hind wing arises closer to the center of the costa. Possibly this species is intermediate between *grannus* and *tragius*,[2] since to the latter it also bears a resemblance. However, *tragius* has a ruddy patch below the apical ocellus of the fore wing, and on the hind wing has the inner and outer marginal areas shaded with light scales.

This species is named for Dr. Marston Bates, who has contributed so much to our knowledge of this genus.

Calisto hysius montana, new subspecies

Upperside:

Male. Dark black-brown. A small obscure ruddy patch occupies an area near the anal angle of the hind wing.

Underside:

Male. Both wings black-brown. *Fore wing* with the cell completely red, this color extending slightly into the neighboring interspaces. Two very faint submarginal lines and a faint discal line cross the wing. Between the inner submarginal and the discal is a black, bi-pupilled ocellus, ringed with yellowish. *Hind wing* irrorated with light scales, strongly near the inner margin, lightly elsewhere. Two submarginal lines as in the fore wing, but more prominent. A single circular and nearly symmetrical ocellus lies in the Cu_1–Cu_2 area just behind the inner submarginal line. Basal to this inner submarginal line is

[1] Bates, 1939, Psyche 46, p. 49 (Notes on Butterflies from Hispaniola).

[2] Bates, 1935, Occ. Papers Boston Soc. Nat. Hist. 8, p. 236, fig. 3 (The Satyrid Genus *Calisto*).

an obscure purplish band, in which, besides the ocellus, are three white spots, one each in the M_2–M_3–Cu_1 interspaces. Basal to the ocellus is an obscure discal line, and still further basad is another line, the latter composed solely of whitish scales. Anal angle with a small black spot.

Length of fore wing, 15 mm.

Holotype, male, Mt. Basil, Haiti, 4500 feet, September 9, 1934 (P. J. Darlington and M. Bates), M. C. Z. no. 25914.

Remarks. This subspecies differs from typical *hysius* [3] (as represented by the series identified by Bates as typical) in lacking the red patch below the subapical ocellus of the fore wing; in the marginal extension of the red into the outer extremity of the cell below; in the white post-median line on the hind wing below, which in the typical is less prominent and bordered with blackish; and in the slightly larger subapical ocellus on the underside of the fore wing. Also, the subanal ocellus of the hind wing below is more nearly round, and has the pupil almost in the center, while in *hysius* the ocellus is oval, with the pupil towards the base.

Calisto confusa debarriera, new subspecies

Calisto hysius: Lathy, 1899, Trans. Ent. Soc. London **1899,** p. 226, pl. 4, figs. 10, 11 (A Monograph of the Genus *Calisto*, Hübn.).

Calisto confusa: Bates, 1935, Occ. Papers Boston Soc. Nat. Hist. 8, p. 239, 240 (separated as "variety B").

Upperside:

Male. Both wings black-brown. A discal dark patch occupies the lower central part of the fore wing.

Underside:

Male. Both wings brown. *Fore wing* with a subapical, bipupilled ocellus, ringed with yellowish. Cell red, which color extends slightly into neighboring interspaces. There are two submarginal (outward of ocellus) lines, and an indication of a discal (basad of ocellus) line. *Hind wing* lightly overcast with a few scattered whitish scales. A single ocellus near the anal angle, with its small white pupil slightly basad of the center. A very obscure line crosses the basal part of the wing. Inward

[3] Godart, 1823, Encyclopedie Méthodique 9, p. 525.

of the ocellus is a line, bluish near the costa, white thenceforwards. The two submarginal lines slightly converge towards the anal angle, and in the latter part are white in between. Basal to the inner submarginal line are three white spots, one each in the interspaces M_2–M_3–Cu_1.

Length of fore wing, 12–13 mm.

Holotype, male, Debarriere,[4] La Hotte Mt., Haiti, 4000 ft., Oct. 13, 1934 (P. J. Darlington). (M. C. Z. male genitalia slide no. 363.)

Paratype, male, same data.

Holotype, M. C. Z. no. 25916. Paratype in the author's collection.

Remarks. This subspecies differs from typical *confusa* [5] in being darker below and with the light lines obscured. The cellular red is darker also. One male from Targi, near La Hotte, and a male from Ennery (both Haiti), seem referable to this subspecies, but both have slight differences.

Calisto herophile parsonsi, new subspecies

Upperside:

Male. Both wings brownish black, with the disk of the fore wings dull jet black.

Female. Similar to the male, but with the disk of the fore wing not quite so dark a black.

Underside:

Male. *Fore wing* rather dark brownish gray. Two submarginal lines, parallel, run from costa to inner margin. Basal to these, near the costa, is a rather large, black, and bipupilled ocellus, ringed with yellow. Basad of this ocellus is a discal line bordered outwardly, in the vicinity of the ocellus, with light scales. It is set perpendicular to the costa and approaches the submarginal lines near the anal angle. All of these lines are somewhat obscured towards the inner margin by a grayish shading, more or less distinct, that covers the whole lower half of the wing. A subtriangular reddish patch occupies the cell. *Hind wing* ground color similar to that of the fore wing, but slightly lighter. Two submarginal lines as in the fore wing, but

[4] Sometimes spelled "Desbarriere." I have adopted the name on the labels of the types, both as the type locality and in the formation of the new name.

[5] Lathy, 1899, Trans. Ent. Soc. London 1899, p. 227, pl. 4, figs. 12, 13.

towards the anal angle whitish in between. A discal and a post-basal line cross the wing, the former basally limiting an area of dull bluish in which are four white spots, one to each of the $Rs–M_1–M_2–M_3–Cu_1$ interspaces, and a black, white-pupilled ocellus (reflecting bluish in some lights), ringed with yellow, in the $Cu_1–Cu_2$ interspace. The discal line is outwardly bordered by yellowish scaling, and the inner submarginal line, which outwardly borders this bluish area, is sometimes basally margined with light scaling. This bluish strip, while normally probably always present, appears to be very easily lost, since of the type series of 10 specimens, but three (the holotype, allotype, and one male paratype) have it; the three most perfect specimens. The remainder of the series consists of specimens fairly well flown, and all lack it. It is difficult to say, by examination of the specimens themselves, whether the absence or presence of this bluish is due to wear, but from an inspection of the series as a whole, it would appear that it was lost by prolonged flight.

Female. Similar to the male, with the following exceptions: the cellular red patch is larger; the ground color is slightly lighter; and the marginal area of both wings appears to be somewhat more whitish.

Length of fore wing; male, 14.5–16 mm.; female, 15–16 mm.

Holotype, male, Buenos Aires, western Trinidad Mts., Prov. Santa Clara, Cuba, 3000 ft., June 19–21, 1939 (C. T. Parsons).

Allotype, female, same data.

Paratypes, six males and two females, same data.

Holotype, allotype, and six paratypes, no. 25917 in the M. C. Z. A pair of paratypes in the author's collection.

Remarks. This race, in common with that of the Bahamas, *apollinis*,[6] is rather indistinct from the typical subspecies. The differences are slight, but seem in the specimens examined, to be quite constant. In appearance, at least, *parsonsi* seems to be most nearly allied to *apollinis*. The two may be separated by the darker ground color of *parsonsi*, and the latter's more distinct bluish band (when present). *Parsonsi* may be distinguished from the typical (described from Habana)[7] in its

[6] Bates, 1934, Occ. Papers Boston Soc. Nat. Hist. 8, p. 136 (New Lepidoptera from the Bahamas).

[7] Hübner, J., 1823, Zuträge zur Sammlung Exotischer Schmetterlinge, 2nd Bund., p. 16, figs. 269, 270.

darker ground color below, duller bluish band, and less distinctly marked lines.

Calisto herophile parsonsi seems to connect *herophile* (s.l.) and *smintheus*,[8] but is quite definitely distinct from the latter. A pair, male and female, from Mina Carlota, in the Trinidad Mts. (1500 ft.), seem to agree with this subspecies.

This subspecies is named for the collector of the specimens, Dr. Carl T. Parsons.

Calisto pulchella darlingtoni, new subspecies

Upperside:

Male. Both wings dark brownish black. *Fore wing* with a large basal area of dull black scales, the scent patch. *Hind wing* with the inner marginal part of the wing lighter.

Underside:

Male. Fore wing dark brownish black, the base overlaid with dull fulvous hairs. Inner margin lighter, almost gray. The subapical ocellus is black, ringed with yellow and bipupilled, the second of which is placed in the margin of the ocellus. Between the ocellus and the outer margin there is an indication of two submarginal lines. Basal to the ocellus is another line, very faintly indicated, that crosses just beyond the cell and extends no further than M_3. *Hind wing* with the ground color as in the fore wing. Base black with scattered fulvous scales. Disk of wing bright golden fulvous, running from costa, where it occupies the basal half of that margin (save for the extreme basal area of black), to the inner margin where it occupies the central two-thirds. Near the costa this fulvous area is crossed by a dark brown, rather sinuate line, parallel to the body axis. Just marginal to the fulvous, near the costa, is another, more obscure line, parallel to the first, but longer, and continuing to M_3 where it enters the now expanded fulvous area, turns slightly and crosses it to the anal angle. Just outward of this line, in the Cu_1–Cu_2 interspace is a much elongated ocellus, ringed thinly with yellowish, and with the small white pupil at the basal end. Outer marginal border twice as thick on the costal half as on the anal half. An obscure post-discal parallels the outer margin, composed of obliquely set dashes. (Basal to this line, in the Rs–M_1–M_2–M_3 interspaces are three white dots, the first two

[8] Bates, 1935, Occ. Papers Boston Soc. Nat. Hist. 8, p. 242, fig. 9.

between the discal and the above-mentioned line; the last on the discal line itself.) This line outwardly limits, near the anal angle, the discal fulvous area, but towards the costa it is set off only by a dull basal fulvous shading. The anal angle is black, basally capped by a curved white bar. A submarginal line is faintly represented, usually only towards the anal angle. The margin, at the anal angle, is irrorated with pale scales.

Length of fore wing, 19–20 mm.

Holotype, male, Constanza, Republica Dominicana, Hispaniola, 3–4000 feet, Aug. 1938 (P. J. Darlington).

Paratypes, two males, same data as holotype; one male, foothills of the Cordillera Central, South of Santiago, Rep. Dom., June 1938 (P. J. Darlington).

Holotype and two paratypes, M. C. Z. no. 25918. One paratype in the author's collection.

Remarks. This subspecies differs quite noticeably from typical *pulchella* in the more extensive and more golden fulvous area beneath (on the secondaries). The discal and median lines that cross this fulvous area are thinner than in the typical race. The subanal ocellus of the hind wing is also much smaller, as is the subapical one on the fore wing. This subspecies has been compared with examples from Camp Perrin, Haiti (± 5000 ft.), and "Hayti, P. R. Uhler," that all agree well with Lathy's figures of *pulchella*.[9] Incidentally, one of the museum's females of typical *pulchella* corresponds to the female form named *tenebrosa* (loc. cit. p. 225) by Lathy, and figured by him (fig. 7). It would appear to be only a minor variant, hardly worthy of a name.

This subspecies is named for Dr. P. J. Darlington, Curator of Coleoptera at the Museum of Comparative Zoölogy.

[9] Lathy, 1899, Trans. Ent. Soc. London, 1899, p. 225, pl. 4, figs. 5, 6, 7.

REVISION OF THE GENUS PLEUROPOMPHA LECONTE (COLEOP., MELOIDÆ)[1]

By F. G. Werner

Biological Laboratories, Harvard University

Genus **Pleuropompha** LeConte

LeConte, J. L., 1862, *Smiths. Misc. Coll.* 3:273. Wellman, C., 1910, *Ent. News* 21: 2, 215, 221,[2] 1910, *Can. Ent.* 42:394. Van Dyke, E. C., 1928, *Univ. Calif. Publ. Ent.* 4:400, 404. Genotype: *Lytta costata* Lec., 1854, monobasic.

The genus *Pleuropompha* belongs to the tribe Lyttini auct. and should be placed near *Epicauta* Dej. because of the patch of silky pubescence on the inner face of the anterior femora. From *Epicauta* it differs in having costæ on the elytra. The other costate genus of the tribe, *Pleuropasta* Wellm., does not have the femoral patch and is glabrous. Elongate third to fifth antennal joints of the male distinguish it from all of the genera of the tribe.

Head subquadrate, densely pubescent except for an impressed median line. Thorax campanuliform, also with an impressed median line. Antennal joints three to five in the male more or less elongate, smooth. All tibiæ with two spurs, in both sexes. First joint of anterior tarsi of male slightly elongated but tarsi not otherwise modified.

Two very distinct species are included, both from North America. These may be found to inhabit also the northern states of Mexico.

Key to Species of Pleuropompha

A. Each elytron with four strong costæ, raised suture and margin set off by denuded margins. Pubescence white. .... *costata* (Lec.)

[1] Published with the aid of a grant from the Museum of Comparative Zoology, Harvard College.

[2] "*Pleuropomph*," probably a *lapsus calami*.

AA. Each elytron with three strong costæ, raised suture and margin not set off by denuded margins. Pubescence pale olive-cinereous. ..... *tricostata* sp. nov.

Pleuropompha costata (LeConte)

Lytta costata LeConte, 1854, *Proc. Acad. Nat. Sci. Phila.* 7:84; 1858, *Journ. Acad. Nat. Sci. Phila.* (2) 4: 23, (♂).
Pleuropompha costata, LeConte, 1862, *Smiths. Misc. Coll.* 3:273.

Black (or dark brown), densely clothed above with flattened white hairs and below with ordinary white pubescence. Elytra with four strong costæ, two arising from the base and two from the humerus, the latter two not reaching the base. All the costæ united posteriorly. These costæ and the raised suture and margin densely pubescent, sharply set off by denuded margins. The elytral intervals with sparser pubescence, so that they appear grey. Narrow; about four times as long as broad. Ten to eighteen mm. long but usually about sixteen.

Head subquadrate; eyes prominent, small, transverse, quite narrow and excavated near the antennæ and mandibles. Median impressed line deep, and conspicuous because of very narrow denuded areas bounding it. The rest of the head, including the antennal calluses, densely pubescent, with flattened hairs. Clypeus also densely pubescent, but with normal hairs. Labrum slightly emarginate, sparsely pubescent. *Antennæ* black. Male: about three times as long as an anterior tibia, reaching to the basal third of the elytra. First joint normal, rather slender, reaching two-thirds across the eye; second and following slender, slightly flattened and loosely articulated. Second joint a little shorter than the first; third to fifth subequal, about two-thirds longer than the second, shiny; sixth to eleventh subequal, short, altogether equal to the fourth and fifth together. Female: first joint reaching to the middle of the eye; second two-thirds the first; third to fifth about equal to the first, normal; sixth to last short, together equal to the second to fifth. *Pronotum* elongate-campanulate, two-thirds longer than broad. Median impressed line as on the head, bounded by a pair of feeble longitudinal ridges. There is often a pair of small denuded spots on the disc just behind the middle. *Legs* dark brown. Pubescence white, black on tips of tibiæ and

on tarsi. Outer spur of hind tibia broad, flattened; inner somewhat narrower, also flattened. Rest of spurs slender, spiniform.

Apparently this is not a very common species. The records are from comparatively few specimens. Wickham took it in some numbers at Alpine, Texas, however.

Type: Holotype (♀) in LeConte Collection, MCZ, No. 4992 (examined); type locality: "Frontera, Rio Grande" (New Mexico).

Additional records: in MCZ, USNM, Ohio State, and others.

New Mexico: Separ (on *Salsola pestifera*), Deming. Texas: Alpine (4400–6000 ft.), Davis Mts. Arizona: Nogales, Willcox, Chiricahua Mts., Texas Pass-Dragoon Mts., Phoenix, Kayenta, Tucson.

Pleuropompha tricostata sp. nov.

Black, densely clothed with slightly flattened, pale olive-cinereous hairs. Elytra with three strong costæ, only one arising from the humerus. Costæ, raised margin and suture more densely pubescent than the intervals but not set off by denuded margins and the intervals are also densely pubescent. The pubescence is almost uniform over the body, a little more flattened on the head. A little broader than *costata*, and averaging smaller, twelve to fourteen mm. long.

Head subquadrate; eyes as in *costata* but slightly broader. Pubescence dense and covering the entire head except for the median impressed line, which is not further set off by denuded margins. Clypeus and labrum as in *costata*. *Antennæ* black. Male: two and one-half times as long as an anterior tibia, reaching to the basal fifth of the elytra. First joint reaching to the middle of the eye, rather slender. Second slender, two-thirds as long as the first; third half again as long as the second; fourth and fifth a little shorter. Third to fifth shiny, rather slender but increasing in thickness outward. Seventh to last short, equal, each being about three-fourths the sixth and together equal to second to sixth. Female: first and second joints essentially as in the male; third a little longer than the first; rest subequal, three-fourths the third and decreasing slightly in thickness. *Pronotum* campanuliform, one-third longer than broad. Median impressed line as on the head. Raised areas as in *costata* but without denuded spots. *Legs* entirely dark brown, rather densely pubescent. Outer spur of hind tibia broad, but

not as broad as in *costata;* inner almost spiniform but both flattened. Rest of spurs spiniform.

Not as common as *costata* and seems to occupy the same range. It has been universally confused with *costata* in collections.

Holotype: ♂, Presidio, Texas, June 1–15, 1941, at light (USNM).

Allotype: ♀, eutopotypical (USNM).

Paratypes: 3 ♂ ♂, 4 ♀ ♀, eutopotypical (USNM).

1 ♂, Dog Cañon, Brewster Co., Texas, Sept. 3, 1912 Rehn and Hebard (Phila. Acad.).

1 ♂, 1 ♀, Brewster Co., Texas, D. J. & J. N. Knull (Ohio State).

1 ♂, Cloudcroft, Sacramento Mts., New Mexico, July 1, 1940, D. G. Hall (USNM).

1 ♀, Roswell, New Mexico, Aug., 1902 (Fall Coll'n., MCZ).

1 ♀, Texas Pass, Dragoon Mts., Arizona, July 19, 1917, W. M. Wheeler (MCZ).

The Female of *Neonympha maniola* Nabokov (Lepid.-Satyridæ)

Since describing this species (1943, Psyche, **49**:68), I have found three specimens of its female (two labelled "Paradise, Ariz.," one "So. Ariz.") in the collection of the United States National Museum. My reference (l.c. pp. 62, 69, 70) to Wright's figures has proved to be correct.

V. Nabokov, Mus. Comp. Zoölogy
Cambridge, Mass.

THREE NEW SPECIES OF CEBRIO (COLEOP., CEBRIONIDÆ)[1]

By F. G. Werner
Biological Laboratories, Harvard University

While rearranging the Cebrionidæ in the Museum of Comparative Zoology, recently, I noted three distinct new species. They are described in this paper.

Cebrio abnormis sp. n.

Male. Slender, tapering behind. Head, pronotum, and scutellum dark brown. Elytra pale, almost white (specimen collected in alcohol), with the apices light tan one-third the length of the elytra and with a tannish suffusion extending forward along the suture, becoming broader on the basal third. Antennæ and mouth parts pale tan. Below brown, with tips of abdominal sternites, tibiæ and tarsi paler.

Head moderately densely and deeply punctured. With a pair of protuberances just in front of and inside the bases of the antennæ, connected by a vague, posteriorly directed U-shaped ridge. Front concave, with the median portion irregularly impressed. Labrum with the sides oblique and with a shallow U-shaped excavation at the apex. Mandibles moderate in size, a little more slender than in *bicolor*. Last segment of the maxillary palpi as long as the third, expanded apically and almost squarely truncated. Antennæ strongly serrate, from the third segment. First segment darker than the rest. Third segment almost twice as long as the second and three-fourths as long as the fourth (excluding the process of the fourth). The fourth segment has the largest process of any of the segments. The distance from the tip of the process to the other side of the antennæ is as great as the length of the segment, excluding the process. The processes on all the segments are more slender

[1] Published with the aid of a grant from the Museum of Comparative Zoology, Harvard College.

than usual and the process of the last segment is acute. Pronotum a little more densely but more shallowly punctured than the head. Posterior angles divergent. Striæ of the elytra somewhat indistinct on the basal half, with the punctures obsolete. Intervals with confused punctures. The striæ and punctures are more distinct on the apical half. Prosternal process rather slender, tapering evenly from base to apex, quite abruptly elevated. Apex of last abdominal segment slightly convex.

C. convexifrons Knull has the third segment of the antennæ serrate but the general coloration and the form of the head serve to distinguish it from that species at a glance. Length, 13 mm. 3¾ mm. wide across the base of the elytra.

Holotype: male, Tuba City, Arizona, July 19, 1935. Gift of C. T. Brues (M.C.Z., No. 26074).

Cebrio atokanus sp. n.

Male. Moderately slender, only moderately tapering behind. Castaneous. Antennæ and underside a little paler. Easily distinguished by the small third segment of the antennæ, which is scarcely half as long as the fourth, and by the broad fourth segment.

Head rather densely but finely punctured. A slight V-shaped ridge runs from the bases of the antennæ back to the middle of the head, marking off the anterior portion, which is slightly lower than the rest of the head. Sides of labrum oblique and the apex moderately shallowly excavated. Last segment of the maxillary palpi as long as the third, and more slender than the third. Apex rounded. Third segment of the antennæ only slightly longer than the second and barely half as long as the fourth. The fourth is very broad. The following segments are about as broad as the fourth across the process but become progressively narrower across the base. Process of the last segment distinct, obtuse. Pronotum less densely punctured than the head. Posterior angles small, divergent. Elytra with intervals distinctly punctured, the punctures being separate from each other. Striæ rather feeble, the punctures dying out, toward the base. Process of the prosternum linear, slender. Apex of last abdominal sternite convex. Length, 12 mm. Width, across the base of the elytra, 3¾ mm.

Holotype: male, Atoka, Oklahoma (Indian Territory) June 13, 1915. H. F. Wickham, Hayward Coll. (M.C.Z., No. 26075).

Cebrio bruesi sp. n.

Male. Slender, tapering behind. Dark brown. Antennæ, legs, and abdomen paler. Possibly close to *emarginatus* Schaeffer but it differs from that species in the absence of a "moderately deep" excavation of the apex of the last abdominal segment.

Head quite densely and moderately deeply punctured. Front concave, with a pair of lateral impressions in the concavity. A feeble ridge runs almost straight across between the bases of the antennæ. Sides of labrum almost parallel. Apex deeply, triangularly excavated. Mandibles moderate in size, a little more slender than in *bicolor*. Last segment of the maxillary palpi as long as the third, not greatly broadened apically and obliquely truncated. Third segment of the antennæ almost twice as long as the fourth. The antennæ are moderately slender, the antennal processes short. Process of last segment very faint, obtuse. Pronotum more densely and finely punctured than the head. Posterior angles divergent. Striæ of the elytra distinct for the whole length; the strial punctures not very distinct. Prosternal process broad. Apex of last abdominal sternite just perceptibly excavated. Length, 13–16 mm. Width, across base of elytra, 3½–4 mm.

Holotype and 1 paratype: males; Ganado, Arizona, July 24, 1935. Gift of C. T. Brues (M.C.Z., No. 26076).

DESCRIPTIONS OF SOME NEW EXOTIC SPECIES OF STAG BEETLES (COLEOPTERA: LUCANIDÆ)[1]

By Bernard Benesh
North Chicago, Illinois

The present paper, covering seven forms new to science, is primarily based on material conserved in our principal collections at institutions indicated hereafter. The writer's best thanks are due to Drs. Nathan Banks, R. E. Blackwelder, E. A. Chapin, E. T. Cresson, Jr., C. H. Curran, P. J. Darlington, Jr., F. E. Lutz, and J. A. G. Rehn for the opportunity of examining the Lucanidæ under their charge, and the privilege of describing the new forms discovered, as well for the many examples, so generously presented, for incorporation in the writer's collection.

Many valuable data were gained from the vast number of specimens examined and some obvious synonymies noted, which, however, are reserved for a future paper.

The new forms may be diagnosed as follows:

Calcodes (Neolucanus) **maculosus** (Didier) ♂

Didier, Etudes sur les Coléoptères Lucanides du Globe, fasc. 7, p. 143, ♀, fig., 1930.

In habitus allied to *N. laticollis* (Thun.), a species endemic to Java.

♂ Head transverse, black, gradually diffused toward the base into chocolate-brown, opaque; mentum broad, nearly straight in front, anterior angles broadly rounded, sides elevated, base nearly straight, declivous in front, remotely punctured with fairly large, shallow punctures. Mandibles porrect, bent upward from basal half, inner edge dentate with a series of five teeth, which number may vary in larger examples. Prothorax broader than long, dark mahogany-brown, disc shining, mar-

[1] Published with the aid of a grant from the Museum of Comparative Zoology, Harvard College.

ginal areas opaque, with a C-shaped black macula in posterior corners; front margin sinuate, anterior angles obtuse, broadly rounded to posterior angle (broadest part of prothorax), thence obliquely truncate to base, latter nearly straight; a median impressed line extends from the front margin to center of the disc (this line extending the full length of the pronotum in the female). Scutellum heart-shaped, with fairly large, close punctures on the base. Elytra obovate, humeri rounded, broadest in the basal third, posterior gently rounded, with two feebly impressed lines, between the humeri and scutellum; of the same color as prothorax, but more shining, margins and suture black; a lateral, orange-yellow macula extends diagonally from humerus to within one and one-half millimeters of the suture and apex. Surface of the head, prothorax and elytra with remote punctures, those on the head largest.

Beneath slightly darker than on the dorsum, feebly shining; anterior tibiæ bifurcate at tip, and not as broad as in the female, with two strong spines in the distal half; intermediate and posterior tibiæ linearly sculptured, spineless; femora remotely punctured, each puncture bearing a short golden seta; abdominal segments margined in black, finely punctured.

Dimension: Length (excl. mandib.) 22.5 mm; mandibles 3 mm.
Head 7.75 mm. wide; 4.5 mm. long (excl. mandib.)
Prothorax 11.5 mm. wide; 6.0 mm. long (at middle)
Elytra 11.25 mm. wide; 14.25 mm. long

Allotype: ♂, Bangkinang, Sumatra, in the Museum of Comparative Zoölogy, Cambridge, Mass.

The female holotype, described by Dr. Didier, does not differ to any extent from the male; in habitus it is slightly broader, resembling much the common Javanese *laticollis*, to which group it phylogenically belongs. The range of the insect, unknown to Dr. Didier, is now ascertained to be Sumatra.

Prismognathus branczicki Nonf., ♀

Nonfried, Berliner Entomologische Zeitschrift *50*: 11, ♂, 1905.

The female, hitherto undescribed, is characterized in subjoined brief diagnosis:

♀ Golden brown, brassy, shining, elongate (narrower than

the female *P. subaëneus* Motsch., used throughout in comparison). Head transverse, broader than long, with a triangular depression, deeper in the frontal angles, extending from the clypeal ridge to occiput; anteocular bosses higher and narrower. Pronotum similar in outline to *subaëneus,* distinctly broader than the base of elytra, with a blackish crescent-shaped macula in posterior angles. Scutellum dark. Elytra one and one-half times as long as wide, diverging to basal third, parallel in median third, thence broadly rounded, base of elytra strongly depressed in ante-humeral area, apical margin distinctly diaphanous. Dorsum uniformly punctured with fairly large, shallow punctures.

Differs from *subaëneus* by its slender and graceful form, finer puncturation, coloration (in *subaëneus* dark castaneus or entirely black), pronotal macula and translucent elytral margins, which, according to Nonfried, is typical of the species.

Allotype: ♀, Szechwan, China, D. C. Graham, 1700 ft. In the United States National Museum, Washington, D. C.

Prosopocoilus duplodentatus n. sp.

Oblong, finely granulate punctate throughout, allied to *P. rubens* Didier.

♂ Head nearly quadrate, broader than long, black, opaque, anterad concave, sloping abruptly toward the clypeus; clypeus subtriangular, with a feeble transverse marginal ridge, top rounded; antero-lateral angles rounded, behind the eyes acuminate, the acumination extending beyond the eyes and overreaching the anterior angles of pronotum; eyes fairly large, round, shining, encompassed halfway by the lateral diagonal canthus; anteocular bosses prominent, gently sloping toward the eyes; anterad to these and slightly inward a roundish fovea. Vertex shallowly and distantly punctured by fairly large transverse-ovate punctures, becoming larger (lunate) behind the eyes. Mandibles asymmetrical, longer than the head, porrect, uniformly arcuate, laterad rounded, interior margin dentate; left mandible with a broad basal cuspidate tooth and four well defined denticles; right mandible with six denticles, the fourth (from the base) largest; below the cuspidate tooth of the left mandible and the two basal denticles of the right, is a column of three teeth on the left and a like number on the right, making

the bases of the mandibles appear like the crown of a molar; the right mandible in repose (clinched) is uppermost and slightly shorter than the left. Antennæ: scape club-shaped, slightly bent, longer than the funicle and clava combined, black, glabrous, with a few setæ at the elbow, and when folded backward, extending to the acuminate post-ocular process; funicle one fifth longer than the clava, first segment subglobose (pear-shaped), slightly longer than the second; second, third and fourth of equal length, subcylindrical, anterad dilated, fifth nearly pentagonal in outline and distinctly longer than the fourth, with a single seta on the apex, sixth as long as the fifth, produced into an elongate acute point, on which occurs a clump of setæ; clava compact, three-jointed, rufescent, eighth segment anterad produced in a lobe with a truncate apex, base glabrous, black, lobe spongy, ninth segment spongy throughout, lobe pointed, tenth segment rounded, spongy, embellished with a central circular litura; lobes of clava distinctly flattened. Prothorax broadly convex, nearly twice as broad as long, granulate punctate, opaque, disc with a few scattered punctures, feebly shining; anterior and lateral areas shallowly pitted with roundish, large pits, gradually diminishing in size and intensity toward the posterior angle; anterad bisinuate, antero-lateral angles obtusely pointed, broadly rounded from anterior third to posterior angles, latter produced into an obtuse point, thence diagonally truncate to base, which is broadly rounded; margins reflexed, laterad and basad delineated by an impressed line. Scutellum as long as broad, heart-shaped, with several irregular punctures, shining. Elytra narrower than the prothorax, broader, however, than the prothoracic base, one and one-half times as long as broad, broadest one quarter the length from humeri, parallel to the middle, thence gradually and gently rounding to apex; humeri angulate and rounded on top; each elytron with a single stria, beginning in the ante-humeral region (one-third the elytral width) and attaining to four-fifths the elytral length; margins reflexed from the broadest point to apex; dark chocolate-brown, densely punctured, opaque; suture narrowly impunctate, shining. Legs fairly stout, black, linearly sculptured; anterior tibiæ distad broadly bilobed, armed externally with four large teeth, second largest, serrate between; intermediate tibiæ with a single central spine, posterior with a denticle; tarsi as long as the tibiæ, glabrous, each

joint furnished, on the venter, with a tuft of golden setæ at the extremity; onychium present; intermediate and posterior tibiæ sparingly clothed with short golden setæ increasing in length and density toward the extremities. Beneath deep chocolate-brown, glabrous; maxillary and labial palpi reddish; mentum feebly bilobate in front, laterad rounded, nearly as long as broad, roughly sculptured by large confluent pits; genæ similarly sculptured as the top of head behind the eyes; prosternal process prominent, terminating in an obtuse point; abdominal segments emarginate, with a few scattered punctures, shining. Length, without mandibles, 17.5 mm.; mandibles 2.75 mm. Female unknown.

Holotype: 1 ♂, Kuanshien, 14–viii–'34, Szechwan, China, Dr. D. C. Graham, collector, in the United States National Museum, Washington, D. C.

Closely allied to the Sumatran *P. rubens* Didier,[2] from which it can be readily separated by its dark coloration (bright mahogany red in *rubens*), shorter mandibles, broad pronotum (in *rubens* not broader than the head, laterad parallel, overlapped by the postocular spine), ovate elytra (*rubens* distinctly parallel) and the granulose sculpture (*rubens* smooth, shining).

Lissapterus montivagus n. sp. Figs. 2, 2a, 2b

Robust, convex, black, feebly shining; allied to *L. tetrops* Lea, and *L. hopsoni* Carter.

♂ Head transverso-quadrate, convex, front sloping, clypeus small, conical, not exposed; anterad broadly concave, angles rounded to canthus, latter completely dividing the eyes; eyes small, larger, however, than in *tetrops*; behind the eyes with an acuminate process, narrowing to base; above the eyes an oblong, deep cavity, extending to opposite the center of the acuminate process; above and behind the cavity, to base, strongly beset with large pits, which become nearly obsolete on the occiput. Mentum (fig. 2b) transverso-trapezoid, feebly lobed in front, with a central kidney-shaped excavation, finely granulate; strongly and distantly pitted toward margins, anterior and lateral pits bearing a seta, base nude. Mandibles symmetrical, porrect, regularly curved, laterad rounded, in distal half with an acute, upward and slightly inward directed tooth, and, on the inferior margin, in the basal third, another

[2] Bull. Soc. ent. France, p. 270, fig. ♂, 1927.

tooth; inner area between the teeth hollowed, base with an angular downward pointing lamina (larger than in *tetrops*). Antennæ typical to the genus (without a distinct clava), second to ultimate segment anterad progressively dilated, flattened, shining, setose. Prothorax transversal, front margin sinuate, antero-lateral angles acute, sides straight and narrowing to base, feebly dilated in posterior third, basal angles square and slightly produced, base emarginate with reflexed margin; laterad and basad strongly punctured; disc with an obsolete median line, and a distant, small group of punctures, in adjacent fields. Scutellum nearly twice as broad as long, rounded, with a few lateral, fairly large punctures, apex impunctate. Elytra with base produced and rounded, humeri angulate, gradually broadening to middle, thence semicircularly rounded to apex; surface irregular, suture glabrous, impunctate, shining, posterior declivate; punctured from the scutellum to margins, the puncturation much larger and denser in the humeral and lateral areas. Beneath black, strongly tinged with red (more so than in *tetrops*), especially the femora; abdomen black. Legs: anterior femur without the ridge-like tooth present in *tetrops*; all femora, on lower margin, fringed with long, dense, golden setæ; anterior tibiæ strongly bifurcate, with four equiform teeth; intermediate and posterior tibiæ with a spine in the distal half; anterior tibiæ with interior margin setose; intermediate and posterior tibiæ strongly setose on both margins; femora distantly punctured, with some punctures bearing prostrate, golden setæ (in *tetrops* glabrous); tarsi short and slender, each segment with a tuft of golden pile; claws small, simple. Female unknown.

Dimensions: Length (excl. mandib.) 25 mm.; mandibles 7 mm.
Head 13 mm. wide; 6 mm. long
Prothorax 11.5 mm. wide; 5.75 mm. long
Elytra 11.9 mm. wide; 13.0 mm. long

Holotype: ♂, National Park, Queensland, McPherson Range, 3–4000 ft., Mar. 1932, Australia, Harvard Exp., Darlington; type no. 25,911. Paratopotype: ♂, same data as the holotype, in the writer's collection.

Compared throughout with a specimen of *L. tetrops* Lea [3] in

[3] Lea, Arthur M.: Trans. Proc. Royal Soc., South Australia, *40*:272–436; 1916.

the Angell collection, Academy of Natural Sciences, Philadelphia, bearing the late Lea's determination label; readily distinguished from the new species by the characters cited above, and the lack of hirsute adornment on the venter and appendages. As *L. tetrops* Lea has not been, to my knowledge, figured, I append a figure (1, 1a, 1b) of the insect here.

Lissotes darlingtoni n. sp. ♂ ♀

Figs. 3, 3a, ♂ ; 4, 4a, ♀

Robust, ovate, piceous.

♂ Head transverso-quadrate, anterad nearly straight, anterolateral angles rounded, canthus and post-ocular process produced; clypeus broad, feebly trilobate; canthus emarginate and rounded, post-ocular process acuminate; eyes fairly small; mentum twice as broad as long, feebly lobed in front, laterad broadly rounded, sloping toward the center and front, strongly cribrate-punctate, more so on the sides. Front strongly declivate, subcarinate on vertex, beset with circular large pits (pockmarked), which become much larger and closer on the vertex and occiput. Mandibles porrect, arcuate, apices acute, finely remote punctulate, shining above, opaque beneath; outer margins rounded, with a median erect tooth; inner edge, in center, with a broad laminate process, which has on the left mandible two, on the right one, feeble indentation; between the central lamina and the base a circular excision, which, when mandibles are in repose, forms a top-like opening; base with an acute, diagonally forward pointing tooth and, above it, a deep excavation. Prothorax broad, anterior angles produced and nearly square, sides subparallel to posterior angles, latter diagonally truncate, base straight; nearly explanate on top, sides sloping, remotely punctured; disc with a central, ovate, strongly punctured depression and, laterad, right and left, two smaller ones; base, opposite the scutellum, with a triangular fovea. Scutellum small, broader than long, apex subacute, center with a transverse fovea. Elytra ovate, broadest beyond the middle, apex acutely rounded; humeri produced, mucronate; each elytron with two obsolete costæ, densely covered with large, ovate pits, becoming smaller and closer toward margin; margin reflexed with some punctures bearing short, golden setæ. Beneath, strongly punctured (excepting the abdomen), shining;

abdominal segments straight, remotely punctured with shallow punctures. Anterior tibiæ distad broadly furcate, with three to four external teeth; intermediate and posterior tibiæ with a centrally located spine, those of the posteriors nearly obsolete.

♀ Analogous in sculpture to male, rufo-piceous, resembling closely *L. novæ-zealandiæ* (Hp), differing from it, however, by its carinate and declivous head (*novæ-zealandiæ* flattened), robust, narrower body (*novæ-zealandiæ* broad and depressed), sculpture, etc. Dimensions of typical examples:

	♂ length;	♂ width;	♀ length;	♀ width;
Mandibles	4.0 mm.		1.25 mm.	
Head	3.75 mm.	7.5 mm.	2.0 mm.	4.5 mm.
Prothorax	4.8 mm.	8.0 mm.	4.5 mm.	6.75 mm.
Elytra	9.5 mm.	7.5 mm.	9.0 mm.	6.75 mm.

Holotype: ♂, Mt. Donna Buang, Victoria, 1500–4000 ft., Dec. 7, 1931, Australia Harvard Exp., Darlington. In the Museum of Comparative Zoölogy, Cambridge, Mass.; type no. 25,912.

Paratopotypes: 3 ♂ ♂, same data as the holotype, in the collection of Museum of Comparative Zoology, Cambridge, Mass.; 4 ♂ ♂, same data as the preceding, in the writer's collection; one male is destined for the collection of the Australian National Museum. Allotype: ♀, same data as the holotype, in Museum of Comparative Zoölogy, Cambridge, Mass.

Paratopotype: ♀, same data as the allotype, in the writer's collection. Described from a series of eight males and two females, captured by Dr. P. J. Darlington, during the Harvard Expedition to Australia, in 1931–1932. I take great pleasure in naming this fine stag beetle after its discoverer.

Nigidius passaliformis n. sp.

Fig. 5

Cylindrical, black, subopaque, glabrous; in habitus resembling a passalid.

♂ Head transverse, broader than long, anterior angles obtuse, diagonally bisinuate to opposite the eyes, latter large and entirely divided by the canthus, which is as wide as the eyes and

laterad rounded; clypeus slightly produced and broadly angular; front strongly declivous, remotely punctured, with a feeble median ridge, and above the eyes an impunctate lateral crest, with adjacent oblong excavations; occipital area slightly elevated, with an adjoining median diamond-shaped depression. Antennæ typical to the genus, with no visible deviation. Mentum transverse-trapezoid, feebly bilobate (part of the left lobe broken off) in front, with two lateral ridges, and overlapping sculpture. Mandibles (apices broken off) minutely and densely punctulate, bent upward, curved, with a central inner tooth, latter distad with a horizontal depression, which thus forms two separate points, of which the superior is simple, and the inferior bicuspid. Prothorax quadrate, with a few obsolete scratches, anterior margin nearly straight, with antero-lateral angles produced and abruptly rounded; laterad nearly parallel to posterior angles, latter diagonal, base feebly sinuate; anterad strongly declivous, with a well-defined, median, truncate boss; disc with a central longitudinal fovea of irregular shape and, adjacent it on the left with two, and right three, smaller impressions. Scutellum: prescutellum cribrate-punctate, broad at base, narrowing toward the scutellum, which is heart-shaped, impunctate, with a basal three-pointed fovea. Elytra parallel, humerus mucronate, posterior regularly rounded; each elytron with 8 striæ, margin rugosely punctate; the striæ, which on first glance appear simple, under higher powers assume an entirely different character, *i.e.*, consist of large circular punctures, interconnected by the sulca; first stria parallel to the suture, terminates on the declivity; second bends outward and forms a complete juncture with the sixth; third and fourth, joined; fifth encroaches on the connection between the second and sixth stria; seventh and eighth terminate near posterior margin; interspaces impunctate, broad and feebly convex, with the triangular area between the first and second stria strongly cibrate-punctate. Beneath, prosternum and prosternal episternum strongly rugose-punctate; prosternal process rounded, not prominent; metasternal episternum punctate, with an impunctate, lateral ridge; metasternum with a median longitudinal impressed line, glabrous, anterad strongly confluently punctate; abdominal segments emarginate, base of each with a line of large punctures (apparently a stridulating apparatus); terminal segment remotely punctured. Anterior tibiæ strongly furcate,

with five external teeth; intermediate and posterior tibiæ with distal spurs prominent, the outer spur longer than the inner one; intermediate tibiæ with two, posterior with three external spines. Female unknown, but as characteristic to the genus, may resemble the male very closely in habitus, with slightly modified mandibles. Dimensions; Length (excl. mandib.) 18.5 mm.; mandibles (minus apices) 1.75 mm.

Head	6.5 mm. wide;	3.25 mm. long
Prothorax	7.0 mm. wide;	5.25 mm. long
Elytra	7.25 mm. wide;	10.0 mm. long

Holotype: ♂, West Africa, Coll. Harvard, in the Museum of Comparative Zoölogy, Cambridge, Mass.; type No. 25,913.

Superficially resembling the Australian *Figulus trilobus* Westw.,[4] assigned, subsequently, by Parry [5] to *Nigidius*; it differs, however, from *F. trilobus* by the broader head (in *trilobus* more triangular in outline), mandibles, cylindrical body (*trilobus* depressed), scutellum (*trilobus* wedge-shaped), etc.; it can be mentioned here that *F. trilobus* Westw. is a true *Figulus*, and not a *Nigidius*, as Parry suggested.

Ceratognathus tasmanus n. sp. ♂ ♀

Figs. 6, 6a ♂, 7 ♀

Oblong, convex, rufous, cribrate-punctate, pubescent; pubescence on the dorsum intermixed (in both sexes) with lanceolate yellowish-gray squamæ.

♂ Head transversal, three times as broad as long (3 : 1), strongly sloping toward the front, anterior angles rounded, behind the eyes broader; vertex with two tubercles on line with the center of the prominent eyes. Antennæ slender; scape one-third the length of the entire antenna, second segment globular, third to seventh uniformly dilated to apex, eighth, ninth and the tenth lobate; clava one-fifth longer than the funicle, pale rufous, with grayish pubescence. Mandibles regularly curved from base to tip, bent upward from the basal third, apices of both mandibles bicuspid, strongly punctate; at the middle of

[4] Westwood, J. C.: Ent. Mag. *5*: 263, 1838.
[5] Parry, F. J. S.: Trans. Ent. Soc. London, p. 343, 1873.

the exterior margin a lateral, laminate, obtuse tooth and, anterad, near the apical third, a superior, subacute tooth. Prothorax one and one half times broader than long, front margin gently bisinuate, anterior angles rounded, diverging diagonally to the middle, thence nearly parallel to posterior angles, latter broadly rounded, base nearly straight; disc with an oblong median depression and, postero-laterad, circular impression. Scutellum broad, apex rounded, base impunctate, with an irregular impressed line, which circumscribes, in the apical area, five unequal punctures. Elytra with humeral angles broadly rounded, sides parallel, apex regularly rounded, suture with an ill-defined costa and each elytron with two irregular costæ, terminating on the posterior declivity. Beneath, densely clothed with long grayish pubescence; abdominal segments nearly explanate, feebly emarginate, confluently punctate; posterior segment slightly convex. Intermediate and posterior tibiæ serrate, with a prominent spine near the apical third; spurs well developed; tarsi short and fairly stout, ultimate segment nearly as long as the others combined.

♀ Of the same general appearance as the male, but with head smaller (2 : 1), with frontal margin slightly transverso-carinate, mandibles shorter than the head, with a central bicuspid tooth on the inferior edge, thorax narrower in front and longer than wide, stouter legs, less prominent spines, etc.

Dimensions: ♂ 12.5 mm. long, mand. incl.; width, 4.5 mm.
♀ 13.75 mm. long, mand. incl.; width, 5.6 mm.

Holotype: ♂, Tasmania, Edwards Collections, in the American Museum of Natural History, New York, N. Y.

Allotype: ♀, same data as the holotype, in the American Museum of Natural History, New York, N. Y.

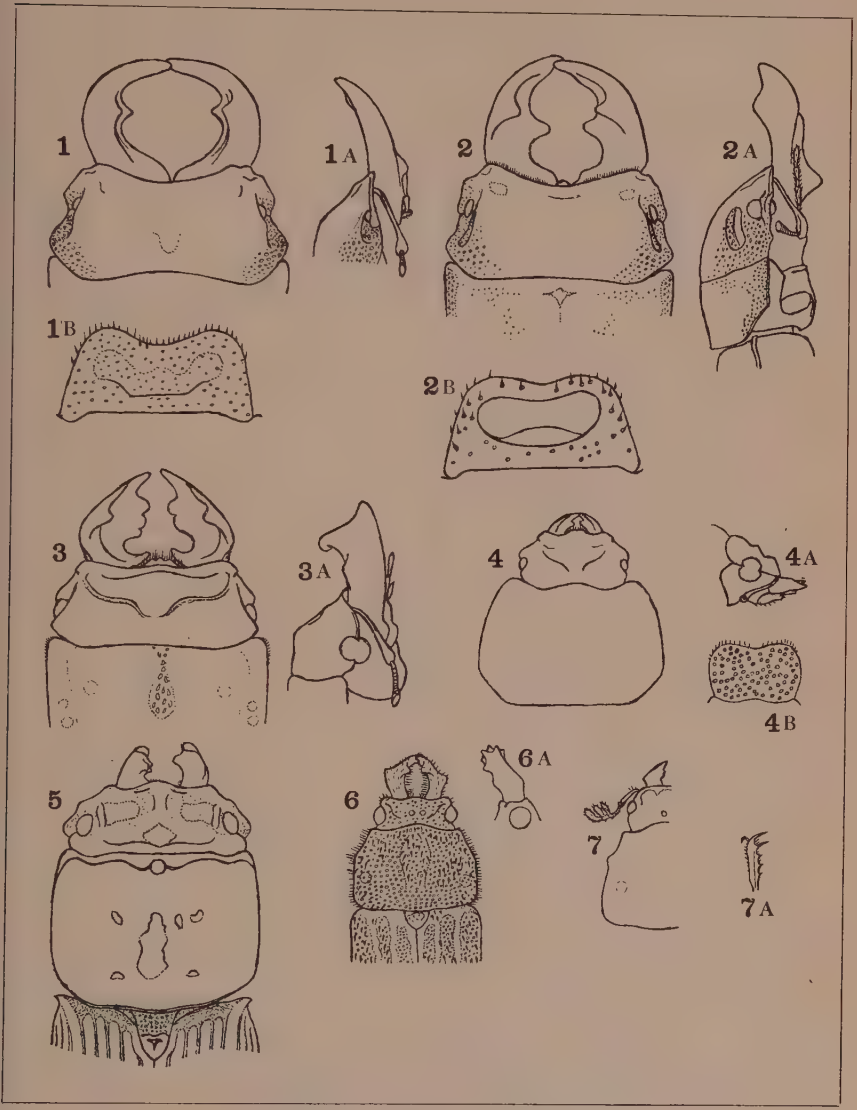
Allied to *Ceratognathus bitumulatus* Carter, from which it can be readily distinguished by the shape of the mandibles, squamæ, non-tumulate elytra, etc. The female here figured has asymmetrical margins on the pronotum; left margin has a slight protuberance, which is missing on the opposite side, as indicated by the broken line in the drawing. Described from a pair of (rather dilapidated) examples; the male is minus left antenna, anterior tibiæ, right intermediate leg and all tarsi; the

female lacks the right antenna, left intermediate leg and posterior tarsus and the tarsi of right anterior and intermediate legs.

Explanation of Plate IV

Fig. 1. *Lissapterus tetrops* Lea, ♂. 1A. Lateral aspect of head. 1B. Mentum.
Fig. 2. *Lissapterus montivagus* n. sp., ♂. 2A. Lateral aspect of head. 2B. Mentum.
Fig. 3. *Lissotes darlingtoni* n. sp., ♂. 3A. Lateral aspect of head.
Fig. 4. *Lissotes darlingtoni* n. sp., ♀. 4A. Lateral aspect of head. 4B. Mentum.
Fig. 5. *Nigidius passaliformis* n. sp., ♂.
Fig. 6. *Ceratognathus tasmanus* n. sp., ♂. 6A. Lateral aspect of the mandibles.
Fig. 7. *Ceratognathus tasmanus* n. sp., ♀. 7A. Right anterior tibia.

PSYCHE, 1943 VOL. 50, PLATE IV



Benesh — Exotic Stag Beetles

SOME NORTH AMERICAN SPECIES OF CHÆTOPLEUROPHORA (DIPTERA, PHORIDÆ)

By Charles T. Brues
Biological Laboratories, Harvard University

A collection of Phoridæ recently sent to me from Cornell University for identification contains an interesting new species of Chætopleurophora. To the description of this which is given below, I have added generic references for several other American species.

Chætopleurophora Schmitz.

Chætopleurophora rufithorax sp. nov.

♀. Length, 2.0 mm. Black; the thorax above reddish brown, lighter at the extreme sides and indistinctly so as a streak on each side of the median line; pleuræ also brownish; scutellum paler, except at the base; front and middle legs entirely pale yellowish; hind legs pale at the base, blackened beyond the basal third of the femora and again brown on the tarsi; palpi fuscous. Halteres whitish. Wings weakly, but distinctly infuscated; heavy veins brown. Front minutely roughened, not shining; quadrate, or slightly longer than wide. Frontal bristles long and stout; postantennals inserted very near together; lower frontal row equidistant, the lateral ones very close to the eye-margin and slightly higher than the median ones; preocellar row of four forming a straight transverse line, equidistant from the lower row and the ocellar row. Median frontal line faintly indicated, ocellar tubercle distinct. Eyes pubescent. Antennæ unusually small, rounded; with a long, sparsely pubescent arista. Palpi very small, with moderately long bristles at tip, but those along the lower margin are weakly developed. Mesonotum subshining, with conspicuous minute hairs; one pair of dorsocentral bristles set very near to the base of the scutellum; sides of the mesonotum bristly behind, but only a couple of these bristles are long and stout. Propleura with two small, but conspicuous bristles at the posterior margin next to the

spiracle and a few scattered small bristly hairs near them. Mesopleura with a large area of bristly hairs above, extending anteriorly almost to the spiracle and one unusually long, stout bristle near the posterior edge. Front tibiæ without any bristles before apex. Middle tibiæ with a pair of long bristles near the base, one at the basal fourth just anterior to the dorsal line and one at the basal third just inside the dorsal line; these bristles very stout and half as long as the tibia; at the apical fourth with a small anterodorsal bristle that does not extend to the tip of the tibia. Hind femur broad; hind tibiæ each with two long stout bristles, both just anterior to the dorsal line, one at the basal third and one just before the tip; also with three terminal spurs; the tibia with transverse rows comb-like bristles on the apical half of its inner surface although these are not so clearly comb-like as in some species and do not form rows on the basal half. Abdomen subopaque above, without noticeable bristly hairs, except at the sides of the second tergite; third tergite longer and narrower than the second; fourth very short, about four times as wide as long; fifth twice as long as the fourth, about twice as wide as long; sixth narrower and longer, about quadrate; seventh minute, not emarginate behind; genitalia with sparse bristly hairs, wings narrow, the costa less than half as long as the wing (35:75); first section of costa nearly twice as long as the second and third combined, third two-thirds as long as the second (20:6:4) costal fringe short and delicate; fourth vein weakly, evenly curved; fifth very faintly sinuate; seventh distinct.

Type from Ithaca, New York, Sept. 6, 1922.

This species is similar to the European *C. erythronota* Strobl. but differs at once by the narrower, opaque front which is wider than long and distinctly shining in the European species. Also the spine near the apex of the middle tibia is reduced to a very weak bristle whereas in *C. erythronota* it is exceedingly large, extending beyond the tip of the tibia. These comparisons are based on a female from Admont, Austria sent me many years ago by Strobl.

Chætopleurophora scutellata Brues.

Trans. American Entom. Soc., vol. 29, p. 344 (1904) (*Phora*). Malloch, Proc. U. S. Nat. Mus., vol. 43, p. 426 (1912) (*Paraspiniphora*).

Brues, Bull. Mus. Comp. Zool., vol. 62, p. 499 (1919) (*Paraspiniphora*).
Schmitz, Monogr. Phoriden, p. 93 (1929) (*Chætocnemistoptera*).

This species should be placed in the genus Chætopleurophora as it has a single large, backwardly directed bristle on the mesopleura in addition to the small hairs that clothe the upper portion of the mesopleura.

Chætopleurophora jamaicensis Brues.

Bull. American Mus. Nat. Hist., vol. 41, p. 431 (1919) (*Paraspiniphora*).
Schmitz, Monogr. Phoriden, p. 93 (1929) (*Chætocnemistoptera*).

This is likewise a Chætopleurophora, but as Schmitz has suggested should rank as a distinct species rather than as a subspecies. The bristling of the hind tibiæ is distinctive; in *jamaicensis* the anterodorsal bristle is paired with the first of the three dorsal bristles and in *scutellata* it is paired, or nearly so, with the second of the four dorsal bristles.

Chætopleurophora multiseriata Aldrich.

Trans. American Entom. Soc., vol. 29, p. 345 (1904) (*Phora*).
Malloch, Proc., U. S. Nat. Mus., vol. 43, p. 438 (1912) (*Paraspiniphora*).
Schmitz, Monogr. Phoriden, p. 93 (1929) (*Chætocnemistoptera*).

This rather common and conspicuous North American species is also a Chætopleurophora, with the mesopleural bristle large and stout.

PIN-LABELS IN MULTIPLES OF 1000, ALIKE

One Dollar Per Thousand

Smallest Type. Pure White Ledger Paper. Not over 4 Lines nor 30 Characters (13 to a line) Additional Characters, 3 cents each, in total and per line, per 1000. Trimmed so one cut makes a label.

C. V. BLACKBURN, 7 Emerson St., STONEHAM, MASS.

CAMBRIDGE ENTOMOLOGICAL CLUB

A regular meeting of the Club is held on the second Tuesday of each month (July, August and September excepted) at 7.30 p.m. in Room B-455, Biological Laboratories of Harvard University, Divinity Ave., Cambridge. Entomologists visiting Boston are cordially invited to attend.

---

81 YEARS OF SERVICE TO ENTOMOLOGY

Three-quarters of a century devoted to the manufacture and design of Entomological Supplies and Equipment assures that your requirements can be met by Ward's. Sterling quality, prompt service, and consideration of your needs are fundamental with us. Purchase your requirements from America's foremost Entomological supply house.

A new catalog of Entomological Equipment is ready. Write for your copy.

WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.

P. O. Box 24 Beechwood Station

Rochester, New York

BACK VOLUMES OF PSYCHE

The Cambridge Entomological Club is able to offer for sale the following volumes of Psyche. Those not mentioned are entirely out of print.

Volumes 2, 3, 4, 5, 6, 7, 8, 9, 10, each covering a period of three years, $5.00 each.

Volumes 12, 14, 17, each covering a single year, $1.00 each.

Volumes 18, 19, 20, 21, 22, 23, 24, 25, 26, each covering a single year, $1.50 each.

Volumes 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, each covering a single year, $2.00.

Orders for 2 or more volumes subject to a discount of 10%.

Orders for 10 or more volumes subject to a discount of 20%.

A set of all the volumes available (44 in all) will be sold for $91.00.

All orders should be addressed to

F. M. CARPENTER, Associate Editor of Psyche,
Biological Laboratories,
Harvard University,
Cambridge, Mass.

PSYCHE

A Journal of Entomology

Volume LI

1944

EDITED BY CHARLES T. BRUES

Published by the Cambridge Entomological Club
Biological Laboratories
Harvard University
Cambridge, Mass., U. S. A.